THE ENGINEERING AND MINING JOURNAL.

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NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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TO OUR READERS.

THE increasing interest being taken here in the gold and silver mining enterprises of the West, as well as the enormous development of that branch of national industry, has induced us to devote greater attention than heretofore to this, in the columns of the ENGINEERING AND MINING JOURNAL. The valuable and interesting letters from all parts of the West by our able correspondents, who are all experts of high reputation and great skill in their specialties, will furnish our readers with reliable information as to every new discovery, and with carefully digested opinions of the results obtained in the mines and metallurgical works throughout the country. These letters will cover the whole field of mining, coal as well as ore mining receiving due consideration, and since it is the most important, in an engineering sense, the former will receive the largest share of our attention.

DESCRIPTION OF ORE-DRESSING WORKS.

To still further supply the needs of engineers and capitalists engaged in mining enterprises, we have commenced the publication of a series of articles in which the great ore-dressing works at Clausthal in the Hartz will be fully described and illustrated by a large number of drawings. This series of articles will, alone, be well worth the entire yearly subscription price of the Journal, and will place within the reach of every one the latest and most approved designs for dressing works, the embodiment of the experience of European engineers.

It is quite unlikely that these plans, excellent as they are, would be suited, as a whole, to the conditions existing at any of the mines in this country, but it is of the utmost importance that our engineers should know the arrangements, in detail, of the most complete ore-dressing works in the world, and it is our object to enable them to profit to the fullest extent by the accumulated experience of these older mining countries. This series of articles will be continued weekly till completed.

MINING AND METALLURGY AT THE CENTENNIAL EXPOSITION.

We have made arrangements for the publication of a valuable series of papers, to be contributed by thoroughly qualified experts, on everything of note connected with mining and metallurgy exhibited at the Centennial Exposition. These articles will be of great value.

LECTURES ON MINING.

We shall shortly commence the publication of a course of lectures on mining by one of the best known European engineers. These papers will be appropriately illustrated, and will represent the present condition of the art as applied to both coal and ore mines. To our mining engineers, mine captains, and miners, these papers cannot fail to prove of great interest and value.

PAPERS OF THE INSTITUTE OF MINING ENGINEERS.

The ENGINEERING AND MINING JOURNAL alone publishes all the papers read before the American Institute of Mining Engineers. The universally recognized great value of these in every department of mining, metallurgy and kindred arts, adds greatly to the interest of these pages, where, by the order of the Institute, they are first published. These papers, when afterwards published in the Transactions of the Institute, can be purchased from the Secretary for $5 a yearly volume ; they form one of the most valuable compilations of technical literature in the English language.

GAS MAKING

being a purely metallurgical question, if we may so apply the term, will receive due attention. We have always looked upon the question of the cheap production of gas, either heating or illuminating, as one that will be solved by the metallurgist rather than by the gas works manager of the present day, and as it is a question of the greatest practical importance to mining and metallurgy as well as to manufacturing and other industries, every progressive step in gas making will be duly recorded, and whatever is of practical value noted.

OUR STATISTICAL AND MARKET REPORTS.

We shall continue to devote to this department the unremitting attention that has made these reports the most accurate, and in every way reliable, that are published in this country.

Our statistics of the coal production of the United States are now being collected, at a great expenditure of time and trouble, for the purpose of showing at the Centennial the development and importance of this branch of national industry.

These reports, which will shortly be published, are the only statistics collected of total coal production of the United States.

Our Coal, Iron, Metal, Mining, and Gas Stock Market reports give, weekly, the very latest and most reliable information on the condition of trade throughout the country. This practical trade department of the Journal will constantly receive the attention its great importance demands. It will be our aim to have our market reports recognized, as they now are, as the standard authority in each department of industry to which this Journal is devoted.

In short, our readers may rely upon having in the ENGINEERING AND MINING JOURNAL, both in the thoroughly practical as well as high scientific character of its contents, the most valuable mining and metallurgical journal published in the English language.

The large increase in our subscription list during the past two years, has convinced us that even in the dullest and worst of times, or perhaps we should say, especially in such times of depression, intelligent and clear-sighted men, whether producers or consumers, desire to know not only the exact condition and prospects of the industry they are interested in—but they want to know how to produce more cheaply and how to economize in consumption. In a word, they want to know what others are doing and how they are doing it, and they will support the paper that will furnish them with this information in a practical form.

The demand for the ENGINEERING AND MINING JOURNAL has been so much greater than was anticipated, that we are unable to furnish single copies of certain numbers, even of the current volume, and we have but a small number of full sets of any of the volumes. Those who desire to have the current volume (commencing 1st January) should apply at once, the supply of some of the first numbers being, as stated, very limited.

THE WASHINGTON MEETING.

OVER and over again have we protested that the work of describing the indescribable elements of the meetings of the Institute of Mining Engineers was far beyond our powers ; that the attempt to do it was painful to us, transparently unsuccessful to those who had attended the meetings, opaquely incomprehensible to those who had not attended them, and superlatively uninteresting to the world at large, not to mention the universe. Yet after every one of these gatherings, a lot of members who delight in the sufferings of a fellow-being begin to "nag" us for the "usual article about the meeting, you know." And we haven't the heroic strength of mind to break the precedent once for all, throw off the deadly spell, and stand forth boldly, telling all malcontents to write their own articles and be hanged.

One thing would console us. If we could succeed in inflicting upon the soul of every absentee the most poignant impression of what he had missed by his absence, we should not have lived in vain. Had we our way, this present number of the ENGINEERING AND MINING JOURNAL should plunge into deep melancholy all members and associates who stayed at home from Washington, and cause them to vow with tears never to do so any more ; while the happy readers who had done their duty in that respect, should, on perusing our glowing sentences, break forth in joyous shouts of *Quorum pars fuimus !*

Alas, the days are past when such familiarities could be freely indulged towards the membership of the Institute. It has grown so large and so distinguished that we must stop thinking of it as merely a knot of personal friends. True, the members are as jolly as ever, when they get together ; but perhaps they are not quite so willing to have their jollity reproduced in print. For now they have a distinguished reputation to sustain. Great scientific authorities pay attention to them ; they shake hands with principalities and powers ; Brother WEEKS reports them laboriously for the *Iron Age* (which didn't always think them worthy of so much trouble) ; soon we shall have them alluding to one another as "my honorable friend, if he will permit me to call him so"—just for all the world as is done in Parliament and the Pickwick Club. Evidently the Institute, young as it is, and so recently but a prodigy of a baby, has already attained the period which in the human species is characterized by cane, stove-pipe, kid gloves, a small moustache, and a great sense of dignity.

We do not see, as yet, any diminution of the social freedom and enjoyment of the meetings. The only trouble that looms up before our prescient soul is the multiplication of committees. That way, in our humble opinion, lies madness. If it were only the good old kind of committee, that never did anything, one might bear it with equanimity. Nobody grudges ECKLEY COXE the honor of his position as chairman of the ancient and honorable Coal Committee. He isn't disturbing anybody about it ; and since it is understood that the report is only to be rendered after the anthracite coal-basins have been exhausted, why, the longer it is delayed, the better for the country. Then there's Prof. EGLESTON, who is at the head of a committee on Poisons and Antidotes. He doesn't bother anybody prematurely about that subject ; but if any member should unfortunately get poisoned, EGLESTON would, doubtless, be glad to receive and put on file in the archives of the committee his *ante-mortem* statement. The Committee on the Manufacture of Iron has, perhaps, been secretly "sitting" on that subject—at all events, that or something else has depressed the business. We might enumerate several other fine old committees, to belong to which is an honor and pleasure, and no trouble. But now every meeting brings forth a

new crop of committees; and they are expected to work, and work hard. Every interesting little discussion ends in the appointment of a committee; and if a sprightly member shows himself a trifle talkative during the colloquy, he is made chairman of the committee. Now, that this is awfully useful, we do not doubt for a moment. What we fear is that it will operate as an extinguisher upon spontaneous effort and the unembarrassed interchange of suggestions and opinions. Several times, at Washington, we had to break away from some delightful social chat to attend the meeting of some untimely committee; and if this sort of thing is to go on and flourish and grow and aggravate, we shall organize ourselves into a grand "refractory committee" of one, and rebel. As we understand the question (since we got out of office) it is the business of the council to take all the worry and do all the business and let the rest of us have a clear field for enjoyment.

But this is merely a warning for the future. Candor compels us to add that, with the exception of a few anxious and overworked committee-men, the crowd of members and associates at Washington seemed to be in the highest mood of pleasure, and quite emancipated from care. HEINRICH, from the South, and WITHERBEE from the North, brought each a paper of great technical value; but once having unloaded themselves, were as happy and unconcerned as if one had been an Aztec and the other an Esquimaux. So likewise the President, having promptly unburdened his soul of a magnificent address on technical education, showed thenceforward an immense feeling of relief, and was, in short, as "folksy" as anybody. One passage in that address, by the way, was more than rhetorical: it was consummate rhetoric, employed to set forth the philosopher's analysis of actual experience. We refer to the description of the manner in which a locomotive engineer identifies himself with his engine—a piece of eloquence and truth which caused an interruption of applause, and which, we are safe in saying, not a man in the Institute, except ALEXANDER HOLLEY, could have written.

No one can have failed to appreciate the compliment conferred upon the Institute by the appearance of the venerable Prof. HENRY before it, and the utterance by him of a carefully prepared address. This was published last week in our columns. Even above its scientific value we note its importance as a recognition of the Institute on behalf of the highest representative of scientific inquiry. The reception at Prof. HENRY's bringing the members into personal acquaintance with the many scientific men connected with the various departments at Washington, was a further recognition and encouragement.

We need hardly say that the reception at Hon. A. S. HEWITT's residence in Washington was both brilliant and select. The leading scientific men of Washington, the heads of Western surveys and a few Congressmen, mingled with the crowd of members of the Institute to form an assemblage forcibly described by one of the philosophic lookers-on as "an awful amount of brains, sir, to be under one roof!" Our friend who got off this remark seemed to think an extra insurance ought to be put on a house which covered so valuable a company. We presume that, since everybody got home on that occasion, safe and happy, he is now at ease in mind.

As to the sessions of the Institute, the room placed at its disposal by the Smithsonian Institution proved to be very convenient and comfortable when once reached; but the Signal Service furnished us some awful weather, rendering the transit to and from the sessions no light matter. The "magnificent distances" of Washington were certainly not made to be traveled in a high wind, with the thermometer at zero. But all these things were forgotten when one was once inside the hospitable walls of the Smithsonian.

On the whole, if we were not afraid of being laughed at as mere parrots and plagiarists, we could say that the Washington meeting was the best yet held. At all events, we know a gentleman who felt that the enjoyment and profit of the meeting had "fully paid his expenses in coming." To old members of the Institute it will scarcely be necessary to say that this gentleman was the one whose expenses had been so often paid before, in the same handsome style. *

THE DECLINE IN THE VALUE OF CONSOLIDATION COAL COMPANY'S STOCK.

DURING the past year we called attention a number of times to the policy of the Consolidation Coal Company in opposing or discountenancing all efforts to reduce the cost of mining in the Cumberland Coal Region, and to the excessive rates of freight it charged on coal passing over its railroads; the only outlets from that coalfield.

In our isssue of the 22d January last, we showed from figures that have never been questioned, and that cannot be denied by the company, that the Consolidation Coal Company, though discountenancing all efforts to reduce the cost of mining, is yet carrying on its mining business at an absolute loss, and probably a very considerable one, on every ton of coal mined; and while all other roads have made large concessions in rates during the past two years, this monopoly maintains the most exhorbitant charges its charter allows, or can be interpreted to permit. In this manner it recoups its losses on coal mining, and, at the same time, impoverishes its neighbors and rivals, with the design of absorbing them when sufficiently extenuated.

We warned the company and its stockholders at that time, that no such unjust policy could succeed when attention was directed to it, and we stated that it would become the duty of the State of Maryland to repeal the charters of these roads, or impose such restrictions or limitations in them as would prevent their use for the oppresssion of any industry.

At the time we wrote Consolidation Coal Company's stock was quoted at $50, *i. e.*, par. The capital is $10,250,000. The stock quickly felt the influence of the light we had thrown upon the management of the Company, and has since steadily declined. A bill was soon after introduced in the Maryland Legislature to reduce the tolls over these roads one cent a ton a mile—still leaving them exorbitant—and to curtail some of the extra charges with which the Consolidation Company loaded its patrons. The remarkable unanimity with which this bill has passed both branches of the legislature, and its certain approval by the Governor, testifies to the justice of our criticism and demonstrates the shortsightedness and injustice of the policy adopted by the company.

The stock that stood at par ($50) on the 20th of January, is now quoted at 41—or a decline of 18 per cent.—*equal to a shrinkage in the total market value of the capital stock of* $1,845,000!! and it is by no means certain that it has yet touched bottom.

It may be that Mr. CAMPBELL is so engrossed with his arduous duties as Commissioner of Public Works of the City of New York, as not to notice the effect his policy has had on the market value of Consolidation stock, but the shareholders may well complain of an administration that refuses them all information as to the profits or losses in the different departments of the company's business, and that involves them in a policy that when brought to light strikes, within a few weeks 18 per cent. from the value of their investment, and may yet increase that loss if persisted in.

SPONTANEOUS IGNITION OF COAL ON SHIPBOARD.

The New York *Herald* of the 3d inst. contained, apparently in the interest of anthracite or semi-bituminous coal interests, a long list of vessels on which it was stated bituminous coal, forming, in whole or in part, the cargo, had ignited spontaneously. The list included 193 vessels, and an additional list of 68 coal laden vessels, posted at Lloyd's, as missing from July 1st, 1873, to Feb. 1st, 1876. Of these last probably some foundered, or were lost by other accidents not due to spontaneous ignition of coal; while of the *Herald's* long list a number were, apparently, also lost or injured from other causes than that stated. The catalogue is suggestive, but not sufficiently accurate to be of much value.

The remarks upon the subject of spontaneous combustion are somewhat crude—thus, for example, it says "the analysis of the (bituminous) coals shows, at a glance, the large percentage of volatile matter which gives to them their dangerous characteristics," and generally, "the sulphur and volatile matter in bituminous and hydrogenous coals are the active agents in spontaneous combustion." To these opinions may be added that of a city "coal paper," which in criticising the *Herald*, says the cases of spontaneous combustion were all or nearly all English coal, and adds: "There are, fortunately, for our American bituminous coals, but very few instances where spontaneous combustion has occurred on shipboard; wherever it has occurred the coal was of a quality known to contain sulphur to a considerable extent (*which is the cause of ignition*)."

The property of igniting spontaneously, possessed by certain coals in this country quite as much as in England, though most common in those containing a large amount of volatile matter and sulphur, is by no means solely due to either the one or the other of these causes which are credited exclusively with it by the *Herald* and the *Coal Trade Journal*. It has been abundantly proven that some of the most self-inflammable coals contain little or no sulphur. Take, for a single example, the "Albertite," which ignited spontaneously last year on the dock at Boston, and is well known to be very free from sulphur. On the other hand, anthracite, semi-anthracite, or semi-bituminous, and many other non-inflammable coals, often contain a large percentage of sulphur. Cannel coal, though containing a very large proportion of volatile matter, and often very little sulphur, never ignites spontaneously; indeed, experiments would seem to indicate that the proportion of water had more to do with self-inflammability in coal than that of sulphur.

A very full discussion of the subject will be found in the ENGINEERING AND MINING JOURNAL, Vol. XX., No. 14 (Oct. 2, 1875), from which we take the closing paragraph:

"The spontaneous ignition of coal is, doubtless, greatly facilitated by, though not altogether due to, the presence of iron pyrites; for the oxidation of the iron pyrites is attended with a considerable development of heat, and by swelling, it splits up the coal, and renders it more pervious to oxygen. The real cause of spontaneous ignition is, doubtless, the oxidation of the organic substance of the coal. It is, in fact, a very energetic case of 'weather waste,' and the precautions to take in each case are the same.

"The coal should, as far as possible, be kept cool and dry, and this can scarcely be effected where it is allowed to accumulate in large quantities in the form of slack. By a thorough system of ventilation with fresh air, it is probable that the spontaneous ignition of coal on board ship, in stock yards, or in the mines, could be prevented; but it is also a question well worth consideration whether it would not be practical to fill the bunkers and holds of coal-laden vessels with carbonic acid gas, which, by expelling atmospheric air, would entirely prevent the oxidation of either the coal or the iron pyrites; and render a cargo of coal, so far as this cause of danger is concerned, as safe as one of iron or flour.

"It is evident that the same remedy would apply to cargoes of oil or other inflammable substances."

In addition to the papers mentioned in our last number as having been read by title at the Washington meeting of the Institute of Mining Engineers should have been given one on "The Tunnel through Church Hill, Richmond, Va.," by CHANNING M. BOLTON, Richmond, Va.

THE CLAUSTHAL WORKS.—No. 2.

CRUSHING AND SORTING OF THE ORE.

CONTINUED FROM PAGE 204.

THE ores to be crushed, from whatever mine they come, are brought into the ore-crushing house; sections and a plan of this crushing house being shown by Figs. 1, 2 and 3. The ores are conveyed to the crushing house in wagons, out of which they are tipped on to screens *a b c*, Fig. 3, these screens being partly inclined and partly horizontal. The screens, of which there are six, are composed of wrought-iron bars 3¼ in. by ⅜ in. in section, bolted together, and kept at a distance of 2½ in. apart by means of cast-iron collars 2½ in. in diameter, 2½ in. long. They serve to separate the smalls ("Grubenklein") from the knockings ("Wänden"), the former falling through the screen into the hopper *d*, from which it is gradually fed by means of the cast-iron revolving cylinder *e* (Fig. 1 and 3), which forms the bottom, to the revolving sorting riddles.

The cleaner stuff ore and ore for spalling are separated at once from the knockings, which are caught on the screen, and are thence scraped off into the shoot *g*, by which they are conducted to the stone crusher *h*. After passing through the crusher the knockings are conveyed to the separating riddles *i* by a sheet-iron shoot, without any particular feeding apparatus. The stuff ore and ore for spalling are lowered by a hoist *s* Figs. 1 and 2, to the ground floor of the building, from which they were taken into the sorting house for dry ores to be hand picked. The spalling takes place outside the building.

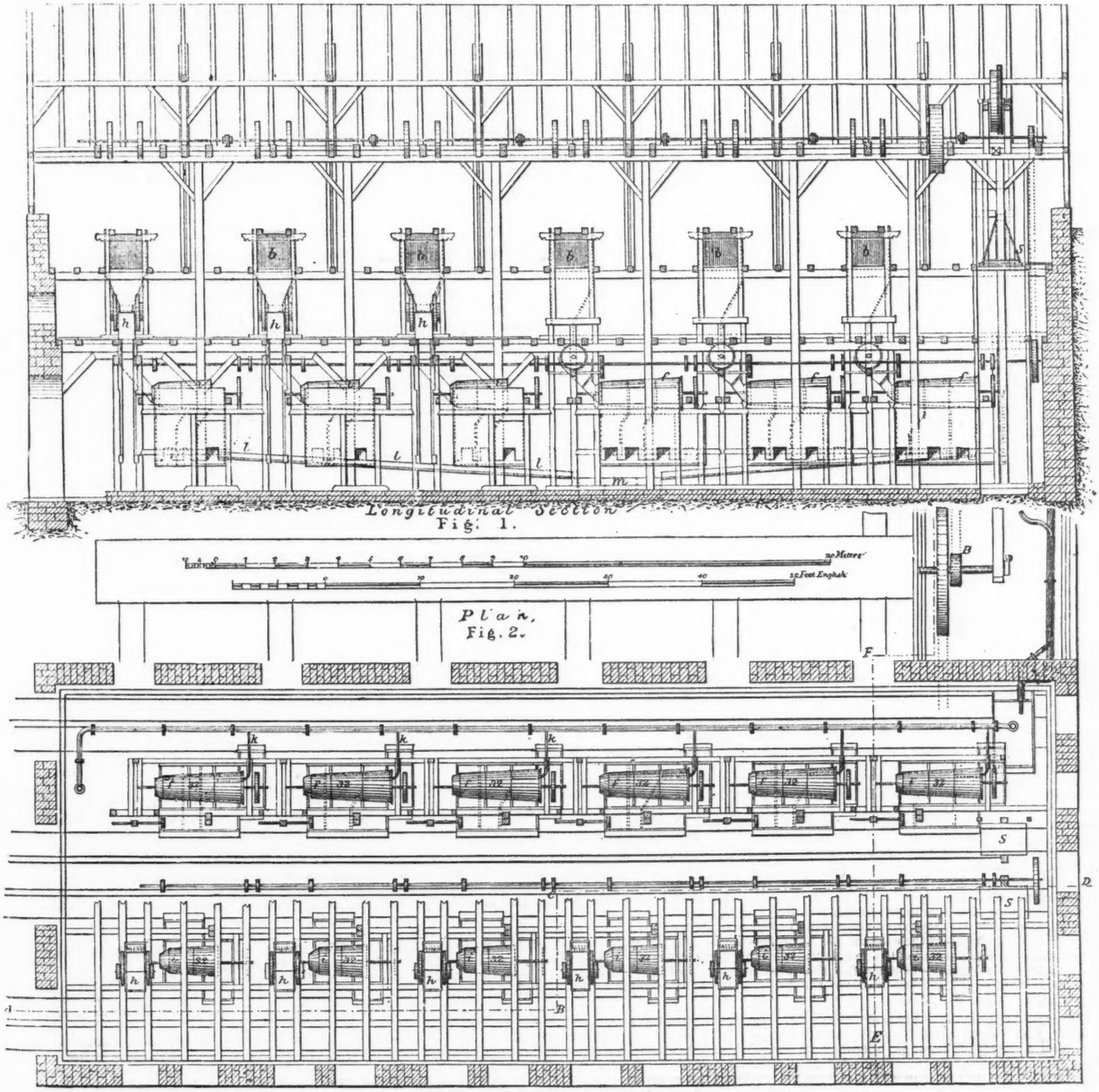
The stone crushers, six in number, are capable of crushing from five to seven tons of ore per hour. They are constructed on BLAKE'S principle, the jaws being made reversible, on account of which the frame of the machine is made of the same breadth for the whole height. Half of the machines are being tried experimentally with a movable wedge support for one of the knee levers; and in the other half the support is fixed.

All the sorting riddles are constructed with cast-iron arms and perforated sheet-iron cylinders. When the axis is horizontal the riddles are made conical; those for the smalls, which are 9 feet long, have diameters at the two ends of 2 ft. 9 in. and 3 ft. 6 in. respectively, while those for crushed ores are 6 ft. long, and the two ends are 2 ft. 9 in. and 3 ft 3 in. in diameter respectively. The conical form thus gives a uniform inclination for both riddles of 1 in 24.

The separation of the crushed ores takes place in a dry condition, that of the smalls with the assistance of water, which is introduced along a length of about one-third of the riddle by means of the small pipes *k* (Figs. 2 and 3) connected to the main water pipes. This water afterwards runs off from the receptacles for the separated ores through sieves, and passes with the finer particles which it has washed from the smalls along the channel *l* (Figs. 1 and 3) into the cistern *m*, and from thence, for further clearing, into a system of settling tanks outside the crushing house. The cleared water is led through cast-iron piping to a water cistern in the coarse separation house, of which we shall speak presently. The deposited slime and ore from the clearing cisterns outside the crushing house, as well as that in the cistern *m*, is taken out when necessary and brought to the coarse and fine separation houses, and has, during the transport, to be lowered to the lower level of the coarse separation house by means of the hoists.

All the riddles make 12 revolutions per minute, the holes being 32 mm. (1·26 in.) in diameter, so that the smalls as well as the crushed ore are separated into but two chief divisions; namely, such pieces as are above 32 mm. in diameter, which collect in the receivers *n n* on each side; and such as are under 32 mm. in diameter, which collect in the receivers *o o* in the middle. These receivers have inclined bottoms, and are provided with cast-iron sliding doors, which are raised from time to time, when the ore is allowed to slide or fall out into wagons for further transport.

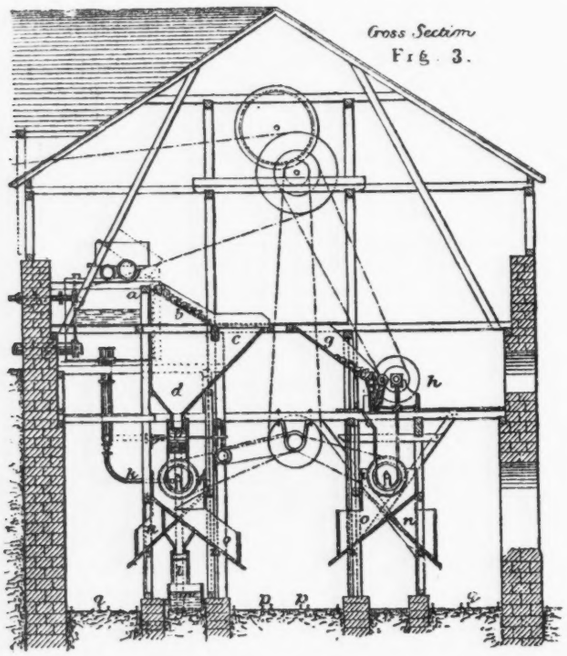
The stone crushers and riddles are driven by a single cylinder Corliss engine,



which, during the sinking of the shaft, also drives the pumps. The arrangements of the driving shaft, pulleys, etc., will be clearly seen from Fig. 3.

The ore under 32 mm. (1·26 in.) in diameter is transported along the tramway *p* to the hoist, and so let down to a lower level in order to be taken along the tramway *q*, and there tipped over on to the tip-ground, or, by means of the lower lying hoist, at once to be let down on to the level of the tip-ground, and by means of the tramways here laid down transported at once to the coarse separation house.

The ore above 1·26 in. in diameter goes for picking and cobbing into two sorting houses; that from the smalls into the first, which is 100 ft. long; and that from the crushed ore into the second, which is 150 ft. long. The internal arrangements of the two sorting houses are similar, and will be readily understood without engravings. On a raised floor are laid down two sets of rails which serve the first for the full, and the second for the empty wagons. These rails are on the same level as the ground floor of the crushing house, and correspond with the tramways *q q*, Fig. 3.



THE CRUSHING HOUSE.

The ore to be picked having been brought to the sorting house in wagons is tipped into a large receptacle formed by two walls made of planks, these walls being so nearly the length of the building itself that only a passage of moderate width remains next to each end wall. These two long side walls do not quite reach down to the picking table, but leave a slit 12 in. high, through which the ore falls of its own accord, or according to necessity is scraped out by the picker, with a peculiar shaped scraper called a "Kratze." The floor of the receiver is formed of a long wall of masonry, triangular in section, which divides the ore into two equal parts towards each slide. Smaller receivers (square in horizontal section) are provided to receive the picked ores; they are fitted at the front with sliding doors, which being raised, the ore falls out into wagons. In the larger building for crushed ores, there are thirty-four such receivers on each side, and in the smaller there are twenty-two on each side. The size of the receptacles is such that they hold rather more than sufficient to fill one of the wagons. The sorting houses are also provided with small channels of sheet iron, the upper ends of which correspond to notches in the picking table, in which they are inserted, while each channel terminates above one of the small receivers. These channels are for the purpose of enabling the poor ore ("Berg-erz") which forms the greater part of the ore to be picked, to be at once delivered by means of the scraper to the receivers. There are twelve of these channels or shoots on each side in the longer building and eight on each side in the shorter. The pickers—boys from about nine to thirteen years of age—stand at the picking table between these channels. The picking boxes rest on horizontal planks, which are attached to the side walls of the large central receptacle along their whole length, and when full the boxes are emptied into the small receivers. Along the two front walls of the building are the cobbing tables where the picked ore is cobbed.

The crushed ore is picked in a dry condition; the smalls with the assistance of water, which is supplied through cast-iron pipes. The water after being thus used is drawn off through openings in the picking table into a suitable channel, and thence into the settling tanks outside the building. From these the cleared water, in common with that from the washing and separating riddles of the smalls in the crushing house, is led through cast-iron piping to the coarse separation house. The ore which consists of galena chiefly, zinc blende and copper, and iron pyrites, is separated by picking and cobbing as follows:

Galena.	1. Stuff ore, or prills. 2. "Ausschlage-erz," or picked ore. 3. "Walz-erz," or ore for crushing. 4. "Poch-erz," or ore for stamping (Halvings). 5. "Berg-erz," or poor ore. 6. "Berg," or attle.
Pyrites.	7. Copper pyrites. 8. Iron pyrites. 9. Markasite ("Wasserkies"). 10. Zinc blende.

The pyrites are sent to the dressing-works in Polsterthal, to be dressed for the sulphuric acid, copper smelting and vitriol works at Altenau. The zinc blende is sold without further dressing. The attle, which has been separated by picking and cobbing, is transported along the tramway to be tipped over into the Zellerfeld Valley. The picked and cobbed stuff ore is let down by different hoists on to a lower level for more convenient transport to the stamps for stuff ore.

All the remaining classes of ore are transported according to circumstances, either along the rails to be tipped over on to the tip-ground, or are lowered by the hoist on to the level of the tip-ground, and then along the rails which are there laid down to the crushing rolls for coarse ore, for further dressing. So far as we have yet followed the dressing, we have described in the crushing building, the separation of the smalls from the knockings, the crushing of the latter, the washing and separation of the smalls, as well as of the crushed ore, into two sorts, namely, first, pieces 1·26 in. in diameter and under, and second pieces above 1·26 in. in diameter; and then in the two sorting buildings the picking of the pieces above 1·26 in. diameter, and the subsequent cobbing.

By these processes, there are obtained for the further real dressing operations, two chief, and essentially different, sorts of ore, namely, one consisting of a most heterogeneous mass of ore in pieces under 1·26 in. in diameter, and an already qualitatively sorted coarser portion.

Both classes are transported (from the crushing or sorting house respectively), according to circumstances, existing requirements, etc., to the lower-lying dressing works by means of the previously mentioned hoists, or they are stored up on the tip-ground, so that as far as regards the further dressing operations we may consider the latter (*i.e.*, tip-ground) as our starting point. We may, however, first remark that the object of the dressing is not only the separation from earthy impurities, but also the reduction of the galena to a fine state of division ("Schleich") suitable for smelting operations as carried on in the Hartz.

TO BE CONTINUED.

COLORADO BULLION PRODUCT FOR 1875—YIELD OF CLEAR CREEK COUNTY AND OF VARIOUS MINES—THE GUNNELL, KANSAS, AND BURROUGHS.

Special Correspondence of the Engineering and Mining Journal.

COLORADO'S bullion product for 1875 foots up, according to the most reliable information yet attainable, a total of $6,299,817. This was divided among counties and localities as follows:

Clear Creek	$2,064,863
Gilpin	1,763,986
Park	835,800
Boulder	767,000
Fremont	342,000
Summit	142,000
Lake	120,940
San Juan and elsewhere	263,228
	$6,299,817

Figures hereafter received may vary the returns of some of the less important districts, but not to any great extent. Of the above amount $2,627,444 was in gold dust, bullion or retorts, and the remainder was almost entirely silver. A small amount of gold ores from the Tellurium mines of Boulder County was sent to Omaha for treatment. The products of Gilpin, Summit and Lake Counties were almost entirely gold, and those of the remaining districts nearly all silver. The Tellurium mines of Boulder county are reported to have yielded about $200,000 in gold.

Clear Creek County, embracing the rich silver district of Georgetown, produced as follows:

Silver ore sent east or to Europe	$941,744
Silver bullion shipped from STEWART'S, JUDD & CROSBY'S and the Pelican reduction works	617,200
Ore shipped to Golden works	29,958
Silver bullion from ore sent to the Boston and Colorado smelting works	438,000
Gold from same source	4,000
Gulch gold from South Clear Creek sold to Central banks	23,961
Gold from the Empire mines and other amounts sent away	10,000
	$2,064,863

These figures cannot fail to give the county credit for all of the *gold* produced. The silver yield would have been much larger but for the injunction on the Terrible mine (that produced over $152,000 in 1874) and the litigation on the Dives and Pelican lodes. The burning of the Stewart reduction works that were handling the lower grade ore also affected the product somewhat.

SOME OF THE BIG MINES.

A recent letter to the Journal placed the production of the Caribou Mine above that of the Gregory. This error doubtless arose from taking as authority a statement of the production of many Colorado mines, that lately appeared in a Colorado paper, wherein the figures given are two or three times too great or too small.

According to the statement of Mr. PRINCE, agent for the Nederland Company, the yield of the Caribou Mine, in 1875, was $204,703.71.

Three firms or companies are mining on the Gregory lode of this city. The writer has not a complete statement of the yield of 1875 as yet, but has been shown figures and facts that will support the figures given below. The New York and Colorado Company have 800 feet of ground, worked to a depth of 600 feet, giving an average monthly yield of $12,000. The BRIGGS BROTHERS own and lease 1,040 feet, opened to a depth of over 600 feet, and produce nearly, or quite, $18,000 per month. The Narragansett property, further west, has not yielded largely but is now in condition to do better. So it is safe to say that the Gregory produced $360,000 in 1875, and reliable parties say this ledge, the first recorded true vein in Colorado, has yielded $10,000,000 since its discovery in May, 1859. The mill ore, of which nearly 90 tons are crushed daily, yields from $5 to $15 per ton, and several thousands of dollar's worth of the higher grade ores are sold to the smelting works every month.

Since last June, the Bobtail lode has been producing over $20,000 per month, and the receipts are steadily increasing. The daily yield is 60 tons of ore, worth from $7 to $10, or more, per ton, and, besides, about $5,000 per month is obtained for smelting ore. This company works the ore through a tunnel 1,200 feet long, and the greatest depth attained is 650 feet.

The Dives and Pelican lodes, of Georgetown, if not prevented by litigation, would, without doubt, give a combined *monthly* yield equal to that of the Caribou for the past year. One part of the Dives gave $70,000 in one week of 1874. The Moose Mine, in Park County, is said to have exported over a quarter of a million in silver last year.

THE GUNNELL.

The Gunnell, at Central, is one of the leading gold lodes of Colorado, and once more ranks among the largest producers. It was discovered in 1859, and a dozen or more pre-emptors obtained exceedingly rich surface quartz therefrom. In 1863 it was sold to various Eastern parties, and seven companies were organized on the properties.

No accurate record of the gold yield of the lode is obtainable except that of the Gunnell Gold Company, owning 450 feet. From the summer of 1864 to July 1st, 1865, Gen. FITZ JOHN PORTER, agent, shipped $109,000 worth of gold retort. From July 1, 1865, to August 1, 1867, J. B. FITZPATRICK, agent, shipped gold to the amount of $482,000, making a total of $591,000, currency value, in about three years. During this time, for various causes, labor, mining supplies, and other expenses, were enormously high, expensive but useless mills were erected, and a heavy bonded indebtedness had been incurred. The present cost of mining, milling, etc., is only one-third what it was in those days, and, consequently, profits are now the general result of mining in place of loss and disaster.

The company abandoned work in 1867, when a depth of 500 feet was attained, and the mine was left to fill with water. Other companies obtained large returns on this lode, but finally abandoned work. The figures of the Gold Company, obtained from its bookkeeper, will enable the reader to judge of what the entire lode produced in those years of activity. Up to 1872 the mine lay idle, when the CHURCH BROTHERS leased it, removed the water, and sold in fifteen months $53,718 worth of gold to the First National Bank of Central. As the ore body then gave out and the leasers had not sufficient capital to sink the shaft, and for deep mining, they were forced to suspend.

What follows will show what practical miners can do, as compared with the poor management and enormous expenses of the olden times. In January, 1874, KIMBER & Co. began work in the Gold Co.'s claim, with their own property adjoining on the west. The shaft was driven downward till a depth of 700 feet was attained. Much "dead work" was done and but little pay was found in much of the ground opened. At that time matters looked as discouraging as they did for many years on the Consolidated Virginia and California, before the great bonanza was found.

Paying ore was eventually met with, and on drifting west into their own property it increased in quantity and value. The profits were supposed to be very large, but figures were not obtainable, owing to litigation that had arisen between KIMBER & Co., and other parties. Last month a settlement was effected between them and FAGAN of the Grand Army or Western, 800 feet of the Gunnell, and successful negotiations have been made for 800 feet still further west, all of which will hereafter be under one management. In consequence of litigation having ceased, the writer is enabled to furnish the following figures, which have never before been published, and which are taken from the books of KIMBER & Co., and of the First National Bank of Central. This firm received the following for gold sold to this bank and ore sold to the smelting works—the actual value being, of course, a little higher.

YIELD OF 1874.

2,225 oz. 12 dwt. 6 gs. mill gold	$40,293.93
Ore sold to smelting works	2,830.93
Total	$43,124.86

The gold came from the Gold Company claim, up to October 1, 1874, when the levels entered the ground further west. All surplus receipts were expended in machinery and in the development of the mine.

YIELD OF 1875.

6,269 oz. 13 dwt. 12 gs. mill gold	$117,565.16
Smelting ore	10,164.40
Total	$127,729.56

MONTH OF JANUARY, 1876.

527 oz. 17 dwt. 12 gs. mill gold	$9,466.40
Smelting ore	2,996.88
Total	$12,463.28

Of the product of 1875, the Gold Company's claim gave 192 cords of ore, yielding $13,628.25. The remainder, $103,936.91, from 694¼ cords of ore, came from the miller or claims further west, showing an average return, including smelting, of 8 ounces and 1 dwt. of gold per cord.

Profits began to be obtained in March 1875. For the 11 months, ending February 1, 1876, the books show the following:

Total yield of 11 months	$128,198.04
" expenses	84,639.44
Profits	$43,558.60

In this time 886¼ cords of ore were milled, or about 2¾ per day, but twice that amount would have been handled were it not for injunctions and the litigation that prevailed, and for the lack of milling facilties, caused by the steady increase of the ore supply of Gilpin County.

The Gunnell ore was transported and crushed in Black Hawk custom mills 1¼ miles away, at an expense of $32 per cord, $7 of which was paid for hauling, —making a total outlay for both, at $32 per cord, of $28,360. With a mill over the mine, owned by the company or party working the same, the actual cost of milling would be but $18, with no expense for hauling, and on the yield of 1875, a saving of $15,952.50 would have been effected. The Leavitt and Gregory have mills so situated, and their total mining and milling expenses are but $5 per ton. The Gunnell gold is from 805 to 830 fine, and when gold is at a premium of 14c. is worth $18.50 per ounce. Allowing 8 tons of ore to the cord, the average value of this ore is $18.61 per ton. From this it will be seen that a profit of 50 per cent. of gross receipts can be made when necessary arrangements have been effected for mining and milling more effectively.

The Gunnell is now opened, so that the 800 feet of ground covered by the Grand Army U. S. patent, displays one immense bonanza of ore from the 340 to the 700-foot level, from 4 to 15 feet wide, worth $150 a cord, of which from one to three feet is smelting ore. Two shafts are being sunk on this property that are now 190 and 250 feet deep, respectively. The profits of this mine, for 1876, will probably exceed the total yield of 1875, as work will hereafter be prosecuted to the fullest extent possible.

Besides the 2,000 feet already spoken of, including the Whiting, which unites with the same, 1,200 feet of territory is being developed on the eastern part of this ledge.

THE KANSAS AND BURROUGHS.

On the Kansas and Burroughs lodes, 2,950 feet are operated under the Fagan management, and 1,000 feet of territory, still further west, on the Kansas, is being secured.

The Ophir-Burroughs shaft is down 960 feet, with rich ore in sight, and sinking will be continued until a depth of 1,000 feet is attained. More powerful machinery is being placed over this mine than has been used heretofore.

An outlay of $20,000 is being made on the Fagan-Kansas property in enlarging and improving the 610-foot shaft, and enlarging the 32 stamp mill by an increase of 20 stamps, and by the setting up of more powerful hoisting machinery, together with a six-inch Cornish pump.

The Monmouth-Kansas is paying as handsomely as ever, and the same rich ore body is found to extend into claims further west. Previous to the commencement of work by the present operator all of these claims had been idle, as had those on the Gunnell. Now nearly 150 men are employed there, and a still larger force will soon be at work on the Gunnell. F.

CENTRAL, Col., March 1, 1876.

AMERICAN TUNNELING.

THE following letter is being circulated by Mr. DRINKER, with the object explained. In giving it to our readers we wish to endorse, in the very strongest manner, Mr. DRINKER'S claims to the courtesy of members of the profession. That there is great need of such a thorough work as that he is so industriously preparing, will not be questioned by any one, and it gives us great pleasure to record our satisfaction that so important a work has been undertaken by so well qualified an engineer as Mr. DRINKER. His education, practical experience, and painstaking industry are guarantees that the work will be one reflecting credit on the profession, as well as the author, and one which will prove of the greatest use both in Europe and America.

No. 1906 PINE STREET, PHILADELPHIA, PA.———1876.

DEAR SIR—The subscriber is engaged in preparing a general treatise on American Tunneling, to show both our record in the past and the present methods in vogue.

No work of the kind has ever been compiled in America, and the only English record is Mr. SIMM'S account of the method adopted in the construction of two tunnels in 1844.

For every new tunnel that is started, engineers are generally put to a vast amount of unnecessary trouble in looking up records of tunnels wherever they may be found, so as to determine on the most advisable cross-section to adopt, if in rock; and what thickness of masonry has been deemed advisable in soft ground; what rate of progress has been attained in various materials, and at what cost, etc., etc. Except in the case of a few isolated papers read before our engineering societies, there are no authentic printed records attainable.

If engineers throughout the country will assist in the work of collecting data, and will kindly forward any facts in their possession, the combined information, if properly collated and arranged, would be of much value. To this practical record of American work will be added a condensed record of the history of European Tunneling, now being prepared abroad, with tables showing the location, length, cost, rate of driving, machinery used, etc., etc., in the construction of the principal tunnels abroad. Returns of South American work have also been applied for, which will be especially interesting, owing to the little that is specifically known of the heavy work done there of late years.

Will you kindly assist in the work, by sending any data, never mind how small, or in what shape, you may have and can conveniently forward? Should you desire it, their safe preservation and return will be guaranteed on receipt. Appended please find a general scheme of the subjects treated, it being proposed to cover not only large railroad tunnels proper, but also mining adits and drifts, canal and water-supply tunnels, etc., etc., the work to be ready for press probably during the Summer or Autumn of 1876.

Any facts bearing even remotely on the subject, will be most acceptable.

Data solicited concerning railroad tunnels, or mining tunnels, headings and drifts, as to their,

1. Location, length, date, time occupied in building, etc.
2. Names of engineers and contractors.
3. Nature and characteristics of material passed through.
4. Cross-section adopted through rock where self-supporting, and if loose, method of timbering and cross-section of masonry.
5. If through rock, whether top or bottom heading driven, with rate of progress and size of heading, whether driven by hand or machine labor. If by hand, number of hammers generally employed on a shift, and number of shifts per day preferred. If by machinery, what make of drill and compressors adopted.
6. If drilling by hand or machine labor, estimate of cost per cubic yard or lineal foot or both, of heading and enlargement. If work commenced by hand labor and machinery subsequently put in, relative rate of advance, and relative cost.
7. What explosive used, and any details as to amount burnt per cubic yard of rock broken in heading and enlargement.
8. Manner of working, and rate of advance of enlargement in rock.
9. If through soft ground (*i.e.*, clay or deposit), size, rate of advance and manner of driving, timbering, etc., preliminary (top or bottom?) headings, with details of subsequent enlarging and arching. Cross-section of masonry adopted. Description of stone, brick or cement used.
10. Final grades and drainage adopted.
11. If shafts or slopes used, any details concerning their sizes, material passed through, rate of progress, etc.
12. What depth of open cut deemed advisable at either extremity (rock or earth cut?) before beginning to tunnel.
13. Price paid, or final cost, per cubic yard, of tunnel and shaft excavation.
14. Price paid, or final cost, per cubic yard, of tunnel masonry.
15. Total final cost of work.

Lastly, if this should reach the hands of any gentleman not personally connected with tunnel work, any information whatever, bearing even most remotely on the subject, is requested; *i.e.*, the locality of any tunnels, naming the railroad or mining district, so that specific information may be sought. Or reference to any publications on the subject of tunneling, whether in scientific periodicals (American or foreign), or even in the daily papers. Address,

HENRY S. DRINKER, Mining Engineer,
1906 Pine Street, Philadelphia, Pa.

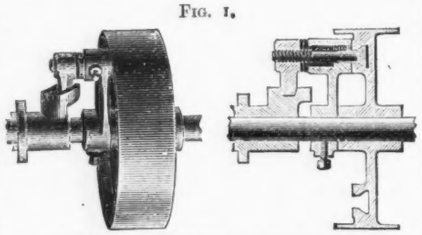
FRICTION CLUTCH PULLEYS AND HOISTING ENGINES.

Manufactured by D. Frisbie & Co., New Haven, Conn.

FRICTION gearing has so many obvious advantages in many cases, it is not surprising its adoption is becoming quite general.

For such uses as pile-driving, or hoisting from ships, or from any moderate depth, it effects a great saving in time, as compared with the use of the common clutch gearing. While with pulleys a friction clutch serves instead of the double (fast and lose) pulley and belt shifting formerly in universal use. A very ingenious device for obtaining this friction is BEAN'S Friction Clutch, the construction and application of which will appear on an inspection of the accompanying cuts.

FIG. 1.



BEAN'S PATENT FRICTION CLUTCH PULLEY.

This is operated by bringing a V-headed bolt (which is held in position by an arm keyed fast to the shaft) in positive contact with a V-ring (which is a part of the pulley) by means of a nut, with a lug on one side, running in an angular slot of the arm of clutch.

The clutch can be moved very easily along the shaft, thereby causing the nut, as it moves in the angular slot, to increase or diminish the friction at pleasure. The exertion necessary is very little (at the shipper) to relieve or communicate full power of friction, and make the pulley as effective as if it were keyed to the shaft.

For light machinery and counter-shaft, etc., one bolt is employed, but for large machinery two or more.

Where it is desired to have the friction slip considerable upon starting, the friction surfaces should be well oiled to allow of their slipping evenly, and prevent wear, when used often.

FIG. 2.

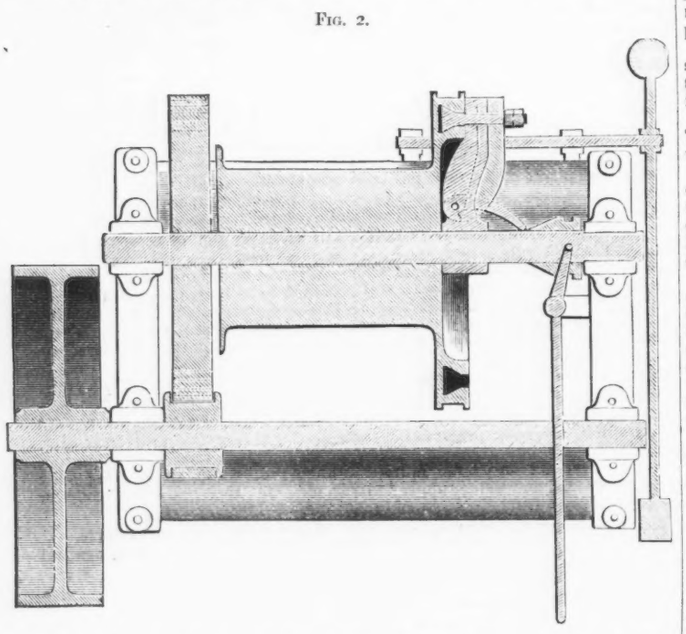
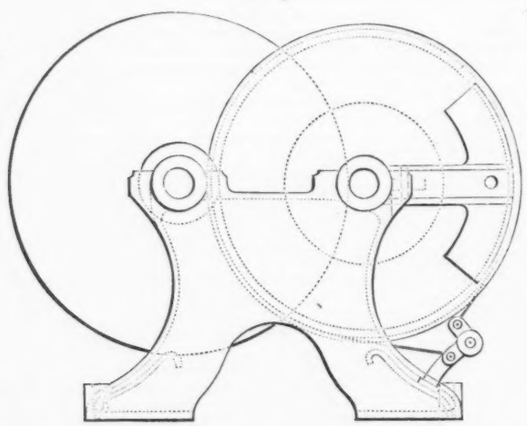


Fig. 2 is a sectional view of the Hoisting Machine, showing a bevel slot in face of drum, in which run one or more bevel-headed bolts (held in position by arms keyed fast to shaft), that are brought into contact with drum by compound

FIG. 3.



levers, the movements of which are effected by a cone clutch that can be moved along the shaft, and is connected with shipper, upon which, when a slight pressure is put, causes the projecting lever resting on cone clutch to move up he incline, and thus makes the machine as effective as if the whole drum were keyed to the shaft, but the drum runs free when friction is removed, and is held in any desired position by means of a brake.

Fig. 3 is an end view, in which only one arm and bolt are shown. It will be seen that the friction surfaces are large, and are so arranged that they can be very easily adjusted. The whole machine is complete in a frame, which can be fastened to a wood or any other foundation desired.

These machines are particularly adapted to hoist coal or freight, where power can be brought within four or five hundred feet, by means of wire rope, or for short distances this can be run direct from a line shaft. Any ordinary man can run them, and they will raise or lower a weight rapidly or slowly. They are built substantially, and are not liable to get out of order, and are furnished for about half the price of a good hoisting engine.

The price of Messrs. FRISBIE & Co.'s engine and boiler, complete, with cylinder 6x12, and with wheels, is $950 with BEAN'S Clutch, and $850 with the ordinary clutch.

Without wheels the prices would be $875 and $775 respectively.

For further information, with regard to prices, construction, etc., those interested can address D. FRISBIE & Co., New Haven, Conn., whose business address will be found in our advertising columns.

THE DUTY OF THE LEAVITT PUMPING ENGINE AT LYNN, MASS., U. S., AS SHOWN BY AN EXPERIMENT MADE IN 1874.

AN elaborate experiment has recently been made on a new pumping engine erected to supply water to the city of Lynn. The results of this experiment indicated that an annual saving of more than 800 tons of coal might be made by replacing a pumping engine of ordinarily good construction and performance (say a duty of 50 millions) by one giving as good economy as in this experiment, if the engine works *day and night* during the whole year.

As the whole cost of the engines, boilers, and foundations erected in place was less than $80,000, the interest of which at 7 per cent. is $5,600 per annum, while the cost of the 800 tons of coal saved at $9 per ton (this cost including the labor of firing) is $7,200, it appears that an annual saving of (7.200 − 5.600 =) 1,600 dollars may be made by such a substitution, provided the items of repairs, attendance, etc., are *the same in each case*.

There are many elements which enter into the calculation to vary the annual saving from these figures which may be estimated with tolerable accuracy by those having experience in such work, but no calculations can be of any value if they are not based on a *correct estimate of the experimental duty*.

The importance of a correct rendering of the duty, then, cannot be denied. The publication of the report on this experiment, in all its details, indicates a willingness on the part of the contractors to invite investigation.

It is to be hoped that the method of allotment of pumping engines in large cities is destined soon to undergo a change. The present method is either to award the contract at a venture to some local or well known builder, or to the builders who will guarantee the largest duty for the least money. Builders can be found who will, under these circumstances, guarantee 90, 100, or even 120 millions for one hundred pounds of anthracite coal.

Having made their contract, they proceed to enlarge the actual experimental duty by various species of manipulations, both of the measurements during the experiments and of the figures after the experiment, until the contract duty is just exceeded by one or two millions. The purchasers do not generally understand the technicalities by the neglect of which these marvelous results are reached and make the payments in good faith.

They do understand, however, when they come to pay the bills at the end of the year, that they have been in some way deceived, and naturally feel afterwards a distrust in all experiments of the kind.

These remarks do not apply entirely to the experiments made at Lynn. In that case the whole facts of the experiments being published, the reader is in a position to judge for himself.

The object of this paper, prepared soon after the experiments, is to publish the data obtained from this report in a tabular form, and to point out what the real economical duty of the engine was in that experiment. Much of the confusion and many of the contradictory results which are obtained with different engines or with the same engine at different times arises from a different manner of computing the duty.

This is particularly noticeable in the trials of the Brooklyn pumping engine in 1860, which, in the hands of the contractor, gave an *apparent* duty of more than 60 millions, and in a subsequent experiment, in the hands of an outsider, a duty of 45 millions. [See Experimental Researches, B. F. ISHERWOOD, Vol. I.]

The duty is an arbitrary quantity intended to be a measure of the weight of water lifted to a certain height by a given weight of coal.

It was originally applied to the Cornish engines, in which the effort of the steam was applied to supplant animal power, in lifting a counterbalance, which counterbalance, by afterwards falling, lifted the water.

I believe, in the original manner of computing the duty, the preponderance of the counterbalance, multiplied by the length of the stroke, was taken to represent the useful work done by the steam. Dividing this quantity by the weight of coal burned gave a measure of the performance of the steam, but did not include the performance of the pump.

When all the engines were applied to pump water under the same circumstances, by means of the same kind of pump, the duty computed in this way was, probably, as fair a means of comparison as could be devised. It must be noted, however, that the duty computed in this way must be reduced 10 per cent. or more, depending upon the proportion and adjustment of the pump before it is a measure of the economic value of the machine.

The unit of measure for the fuel was, originally, a bushel of Welsh coal which weighed 98 pounds, afterwards increased to one cwt. = 112 lb. avoirdupois.

In modern experiments, the unit has been taken as 100 pounds of anthracite coal.

The measure of the commercial economy of any pumping engine is, evidently, the weight of water lifted from the source of supply to the reservoir, by a given weight of coal, the head, necessary to overcome the friction of the pipe, being added to the actual difference of level between the well and the reservoir, in determining the height, or what is the same thing, the height equivalent to the pressure shown by a gauge at the level of the surface of the water in the well, and connected with the force main close by the pump.

This is what *should* be called the "*Duty*."

The value of the duty computed in this way, evidently, depends upon:

1st. The quality of the coal.

2d. The efficiency of the boilers.

3d. The efficiency of the engines.
4th. The efficiency of the pumps.

The first of these, namely, the quality of the coal, is entirely independent of the engines or boilers, and should be the *same in every case where a comparison is made.*

The variation of this item is one of the means resorted to, to enlarge the experimental duty of an engine. That is, the contractor, either by chance or artifice, generally obtains a coal for the experiment that contains less ashes and refuse than is found in the coal afterwards supplied to the engine. The experimental duty is therefor as much greater than the average duty, as the refuse and ashes in the coal used during the experiment is less than that used afterwards, it being an experimental tack that the economic value of anthracite or semi-bituminous coal varies nearly proportionally with the amount of refuse contained.

The next error in the experiments, as generally made, is in the volume of water that is assumed to have been delivered by the pumps. This is generally assumed to be the whole displacement of the pump piston instead of the volume actually delivered.

The volume of water actually delivered is the only item that affects the commercial economy.

It is a fact of no moment to the consumer what the displacement of the pump may be but only how much water is delivered.

In general it may be said that the proportional excess of the displacement of the pump-piston increases the *apparent* duty nearly *pro rata*. For if this difference is due to the water which runs back through the suction valves before they close, or to a partial vacuum formed in the pump cylinder, the space left vacant is passed over by the pump-piston without resistance, or if it is due to a volume of air in the pump which is alternately expanded and compressed, the air gives out by its expansion as much work as is absorbed by its compression, or if it is due (as was probably the case with the Lynn engine) to a volume of air which was drawn into the pump barrel compressed and expelled with the water, it has the effect of reducing the density of the water in the force main and therefore the resistance to the plunger. In case, however, the water leaks back through the discharge valves during the suction stroke or through the suction valves, or past the plunger during the discharge stroke, the work on the plunger is not reduced.

In any case, however, it is fair to take the volume of water actually delivered, and not the displacement of the pump-piston.

The third source of error is generally an assumed pressure against which the pump is presumed to work, being greater than the static pressure by an amount necessary to overcome the friction of the pipes. This pressure should always be measured by a *mercury column* gauge, as spring gauges are not to be relied upon for accuracy at high pressures.

The following table, computed from the facts given in report by Mr. R. H. BUEL and myself, shows generally the methods and results. We concluded it was necessary to reject two of the elements measured, namely, the pressure in the force main as shown by the gauge, and the water condensed in the jacket as determined by measurement after the experiment was concluded. The water pressure was measured by a gauge which had not been tested, but which was assumed to be correct by the board.

There are three checks for this pressure, all of which unite in indicating the gauge to read about 2 pounds too much, viz. :

The pressure equivalent to the static head of the water in the pipe above the gauge + the head necessary to overcome friction computed by the formula given in RUNKINE'S "Civil Engineering" + one pound (see report)	71.21
The pressure equivalent to the steam pressure on the steam pistons reduced to the water piston, an allowance of 2 pounds per square inch, on the low-pressure piston, being made to overcome friction of engine and work air-pumps, etc	72.96
The mean pressure shown in the pumps by indicating cords	73.21

The last two are nearly identical, and the first, being the pressure in the pipe, is exceeded by them by (73.21—71.21=) 2 pounds, being the pressure necessary to lift the two sets of valves and overcome the resistance of the passages of the pumps, a very probable result, certainly little enough. The theoretical pressure in the pipe is certainly enough, for it supposes the pipe to have been filled with solid water, while it probably was filled with water containing nearly 4 per cent. of air. This pressure has been assumed in computing the duty of the engine.

We have also rejected the water experimentally determined to have been condensed in the steam jacket, for not only was this amount ridiculously small, but it had only a temperature of 98°, while it should have had a temperature of 212°, if the jackets were working properly. The jackets, during the experiments, returned their water of condensation directly to the boiler. The amount of water condensed in them was determined by breaking a joint in the return pipe, and allowing the water to drip for a few minutes into a pail, after the conclusion of the experiment.

Rejecting this determination, and assuming the computed value of the water condensed in the jacket, the performance of the boiler is raised from a very poor one to the very good one that would have been expected from the good proportions and slow rate of combustion. Also the pounds of water per hour per horse power, to that found in other engines of the same proportions.

The water condensed in the jacket is computed by allowing 21 units of heat per square foot of jacket surface per hour, for each degree difference between the mean temperature of the steam in the cylinder and the steam in the jacket. The experiments from which this co-efficient was determined, is found in the tables appended.

In conclusion it appears that the actual duty of this engine, as shown by this report, was about 87½ millions for *one hundred pounds of commercial anthracite coal*, and I am of the opinion that the real duty was a little less than this, owing to the air drawn into the pump through the air-cock and being contained partially in the water when measured at the weir.

The reduction of the duty given in the report to these figures does not cast any doubt on the economy of applying compound engines to pumping. The benefits of compounding that one would expect to realize, particularly in engines having a slow speed of piston, is that the cylinder surfaces, which are in contact with the steam at the temperature and pressure of the boiler, are never exposed to the vapor of the condenser, the same result being accomplished in the "Cornish" engine in another and more costly way.

Now, as the best duty of the Cornish engines for 100 pounds anthracite coal (in the sense used in this report) is about 80 millions, it would appear that the result is accomplished as well in one way as the other, leaving the compound engine every advantage of simplicity, less liability to accident, necessity of repairs and first cost.

Nevertheless it appears that a compound engine giving a duty of 90 millions has yet to be built.

59 and 61 Liberty Street. THERON SKEEL.

APPENDIX.

DIMENSIONS OF ENGINES.

Diameter of high pressure cylinder (inches)	17.50
" " low " " "	36.00
" " pump-bucket, "	26.10
" " " plunger, "	18.50
" " high pressure piston rod, "	3.00
" " low " " " "	3.75
Stroke of all pistons, (feet)	7.00
Clearances,	
High pressure cylinder (cub. ft.) 0.34, (per cent.)	2.96
Low " " " 5.22, "	1.06
Diameter and weight of fly wheel	26½ ft. – 24,000 lb.
Effective areas of pistons (square inches),	
High pressure, 237.0, Pump plunger	268.8
Low " 1012.3, " bucket	266.2
Ratio 4.27:1	
Ratio of effective area of low pressure piston to effective area of pump (mean)	3.78:1
Displacement of pistons,	
High pressure piston, per stroke, (cub. ft.)	11.52
Low " " " " "	49.20
Pump bucket, " " "	26.00

DIMENSIONS OF BOILERS.

2-Cylindrical boilers, each 60 ft. diam. and 16 ft. long, with 77-3 in. tubes in each boiler 15 ft. long,

Grate surface, (sq. ft.) (2 boilers)	55.
Heating do. (sq. ft.) "	2086
Cross section of flues, (sq. ft) "	6.49
Height of chimney, (ft.)	120
Diameter of chimney, "	4
Proportions,	
Heating surface to grate surface	37.9:1
Cross-section of flues to grate surface	1:8.47
" " " chimney " "	1:17.50

DIMENSIONS OF WATER PIPES.

Height of top of stand pipe above bottom of well, (ft.)	163 31-100
Length of force main from pump, (ft)	1904
Diameter " " " " (inches)	20
Total number of degrees in all bends	325

RECORDS OF EXPERIMENT. (SEE REPORT OF BOARD.)

Duration of experiment, (hours)	52
Hourly Quantities, (average of whole experiment,)	
Pounds of picked anthracite coal consumed	291.5
" " ashes and refuse withdrawn	22.4
" " combustible consumed	269.1
Pounds of feed water, exclusive of water from steam jackets, which returned to boiler	2501
Pounds of water condensed in jackets, (calculated)	324
Pounds of water evaporated in boilers	2825
Cubic feet of water delivered by pump	27510
Displacement of pump bucket	28314
Pressures,	
Boiler by gauge, (pounds)	75.62
Vacuum, (inches)	28.
Barometer (pounds) 14.68, (inches)	29.91
From indicator cards,	
Initial High 85.80, Low	26.90
At cut-off " 84.10, "	....
Terminal " 31.50, "	7.00
Mean back " 15.27, "	2.05
Mean total pressure " 59.72, "	12.92
" indicated " " 44.45, "	10.87
" net " allowing 2 pounds per sq. in. on low pressure to overcome friction	8.87
Pressure on Water Mains, by gauge	64.2
Equivalent to distance from gauge to water, (pounds)	8.21
Indicator cards from pump	73.21
Temperatures,	
Steam due to boiler pressure	320°.3
Engine connection by thermometer	324°
Smoke in boiler flue	334°
Water condensed in jacket	98°
Feed water	95°
Condensed water from hot well	91°
Water in pump well	41°
Atmosphere	32°
Engine room	37½°
Fraction of stroke when steam was cut off	33-100
Number of times steam was expanded	12
Per centage of refuse in coal	7 7-10
Number of revolutions per hour	1104.0
" " " " minute	18.4
Rate of combustion.	
Pounds of coal per hour per sq. ft. grate	5.30
" " combustible " "	4.89
Pounds of coal per hour per sq. ft. heating surface	145-1000
" " combustible " " " "	134-1000
Economic performance of boiler, including water condensed in jacket as calculated:	
Pounds of water evaporated per pound of coal from 95°	9 69-100
" " " " " " 212°	11 24-100
" " " " " " combustible 95°	10 50-100
" " " " " " " 212°	12 18-100
Horse power developed:	
Total high 110.4, low 102 0, both	212 4
Indicated " 82.2, " 85.8, "	168.0
Net (allowing 2 pounds to overcome friction on L. P.)	152.2

Cost of power per hour in pounds of combustible:

Total horse power	1.27
Indicated "	1.60
Net "	2.77

Cost of power per hour in pounds of coal having 1-6 refuse:

Total horse power	1.52
Indicated "	1.92
Net "	2.12

Cost of power per hour in pounds of steam, including water condensed in jacket, as calculated:

Total horse power	13.3
Indicated "	16.8
Net "	18.7

Rate of Condensation of Steam in Jackets of "Brooklyn Pumping Engine," and Engines of "Bache," experimented on by B. F. ISHERWOOD and C. E. EMERY, and given in their reports:

	Brooklyn.	Bache.
Surface of jackets in square feet	250	20
No of experiment	1	(14 15 16)
Temperature of steam in boiler	224°	324°
Mean temperature of steam in cylinder	180°	201°.5
Difference between jackets and cylinder	44°	123°
Pounds steam per hour condensed in jackets	218.2	52.2
Units of heat transferred per sq. ft. per hour per 1° difference of temperature of steam in jackets and steam in cylinder	20.4	21

LYNN ENGINE.

Temperature of steam in jacket	320°.3
" " in cylinder (mean)	168°.3
Difference	152°.0
Surface of steam jacket in sq. ft	90
Pounds of steam condensed per hour in jacket of Lynn engine—	
$(90 \times 21 \times 152° \div 888 =$	324

DUTY—

Given in report, being calculated on whole displacement of pump pistou, on pressure shown by gauge (73.41) and on 100 lb. of the *picked* anthracite consumed; viz.,	
$73.41 \times 535.503 \times 7 \times 57,357 \times 100 \div 15,160 =$	103,923,215
Estimated by writer of this paper as correct, being calculated on volume of water delivered into reservoir, on pressure equivalent to total height between surface of water in reservoir and well, plus head necessary to overcome friction of pipe and bend, and for anthracite coal having 1-6 refuse, viz.:	
$71.21 \times 57.357 \times 26.0 \times 0.96 \times 100 \div 16,794$	87,351,000

Items which increase actual duty of 87,351,000 to that given in report of 103,923,215 foot pound per 100 lb. anthracite coal:

Using a coal having 9 per cent. less refuse than the average anthracite of commerce	10.8 per cent.
Error in pressure gauge	2.8 " "
Not allowing for loss of action in pump	4.2 " "
Total increase of apparent duty, viz.:	
$(110.8 \times 102.8 \times 104.2 =$) $118.9 - 100$	18 9-10 " "

NOTES ON THE WASHING OF COAL.

By Max. Evrard, Civil Engineer, Saint-Etienne, France.

THE drawbacks resulting from the delivery direct—whether for sale or for use in works—of the coal just as it is raised, often intermingled with stone or shale more or less partaking of the nature of coal, are too generally known to render the enumeration of them necessary; in fact, no one would be so bold as to deny that the use of such coal in the domestic fireplace, as well as in the arts, is a cause of loss and inconvenience.

Among the charges which may be brought against shaly coal, the first which presents itself to the mind is the fact of having to pay for the carriage—sometimes a costly item—of a useless substance. To give entire satisfaction to consumers, it is necessary that the slack, as it comes to the surface, intended for firing steam boilers, should undergo a process of washing such as has been for some time adopted for slack that is intended for making coke. The general interest demands this, for if some privileged colleries are enabled, by the nature of their seams, to send out their coal with only from 10 to 15 per cent. of ash, there are others which, notwithstanding all the care with which the operation of screening is conducted, can only deliver them with about 25 per cent. of ash. Very frequently this percentage is exceeded, so that an improvement in the quality should be looked upon as an imperious necessity.

The increase in the cost of carriage—an item which is not, of course, so heavy in the case of works in the neighborhood of collieries—is far from being the gravest charge which may be brought against impure coal; and in the iron manufacture, the choking up of the grate bars, the longer duration of the several operations, the variation in the nature of the products obtained, the waste of fuel by continual stirring and clearing the bars—all these are only so many drawbacks of a most serious nature.

If from coals we pass on to cokes, the consequences of want of purity are still more serious; any regular method of working becomes impossible when the nature of the ash and its proportion varies each instant. Be it also remarked that cokes either entirely unwashed, or only partially so, are generally wanting in cohesibility and compactness.

It is very difficult, when it becomes necessary to have recourse to several coalmasters on account of the large consumption, to obtain this uniformity of composition and quality; and it was to get rid of all these difficulties that MM. PETIN and GAUDET decided, two years ago, to erect at their Givors works the appliances for washing and coking from which they have experienced excellent results. Under the conditions in which the treatment of the coals takes place, a saving is realized on the cost of coke, which at the same time possesses all the good qualities that may be expected of it.

Before describing my classifying apparatus, to which these results are partly due, I will venture to point out the principle on which my system of washing is based.

It is admitted in principle, and it is an undeniable fact, that only grains of equal size can be operated upon in order to effect their separation into different qualities by water, either by means of an ascending current or by oscillations, the intensity of which depends upon the weight, a circumstance involving the necessity of screenings all the more thorough as a more perfect separation is desired.

This division into a greater or less number of sizes, which in the case of ores is effected without difficulty, becomes impracticable in the case of coals, on account of their friable nature; and one is generally induced to only arrange for three qualities, viz., "*grains fins*" (fine) mixed with what does not exceed 3 centimetres (1·18 in.) in size; "*dragées*" (small shot); "*grêles*" (hailstones). The first and second qualities only are submitted to the operation of washing; the third merely undergoes screening by hand. With rare exceptions, up to the present time, only the first of these classes, the slack sifted, has been treated, and that by two well-defined methods: the one by an oscillating motion, and the other by being drawn along by water.

The first system represented by the ordinary wash-trough with plunger, effects a thorough purification, but at the price of considerable waste, which is due to the drawing into the trough of the mud formed by the dust (*moures*) with the ashy sand.

The second system can, in any case, only effect an imperfect washing, because the drawing along by the water of particles of coal of different sizes admits, in principle, of the forced drawing along of the shales and sand of smaller volume, but of greater density.

In order to diminish the waste caused by the wash-troughs with plungers, almost inapplicable to the fine coal, recourse is often had to screening a second time, or to sifting through canvass, the meshes of which are a few millimetres,* in order to partially get rid of the dust, and afterwards re-mix it with what has already been washed, thus impairing the purity of the latter. Besides, these operations of sifting are not free from difficulties; it often happens, indeed, that they are rendered impossible by the wet state of the coal just as it is brought to the surface.

My new process affords a remedy for all these drawbacks. Instead of separating the dust, previously to washing the granular particles and afterwards cleansing them in various appliances, I effect at one and the same time the cleansing of these fine particles and also the classification, in the order of their sizes and *relative* densities, of the whole of a charge of slack, taken just as it comes (*menus sortants*). By this expression, I mean what is charged in with the shovel after the removal of all pieces of any considerable size.

I ought to state, before proceeding further, that this plan of separating into classes, by means of water, the unscreened coal as it comes from the pit (of the success of which, however, I feel no doubt) has not yet been carried into practice, inasmuch as, up to the present time, my system has only been employed for coals screened to 3 centimetres (1·18 in). It is, then, to the latter case only that the following description will apply:

The size of the apparatus, even for a considerable output, is never large, for a square metre (about 10¾ square feet) of washing table is sufficient to separate into classes 7 tons an hour; a table of 3 metres (9ft. 10 in.) in diameter would, therefore, suffice for the treatment of 50 tons an hour.

The washing takes place in a cylindrical, or rectangular tank, 3 metres (9 ft. 10 in.) deep, the bottom of which consists of a frame covered with a perforated plate, through which the water, forced up from below, is admitted, and may rise to the top of the tanks. This tank is continued for a few metres below the frame, and communicates, at the bottom, with a water reservoir, at least double its own capacity. When the apparatus is not at work, the water rises almost to the frame, or wash-table. The water reservoir is closed tight; it is sufficient, therefore, to admit therein a gas under pressure, for the water to be forced into the tank; and we hope, from this arrangement, to derive considerable advantages in respect to labor and the saving of waste.

Although the water in the reservoir is cold, steam serves to set it in motion. Condensation only takes place for the first few seconds, and ceases as soon as the water is heated to a depth of two or three centimetres,† becoming, for that time, almost inappreciable; what proves this most conclusively is, that in emptying the apparatus, at the end of a day's work, by pressure of the steam, as far as the intersection of the two tanks, the water only becomes slightly tepid, and that quite at the last.

A three-way cock, or any other means of distribution, is sufficient to obtain all the effect of a pump, or of a plunger, by producing either a constant or intermittent upward current, or oscillations to any degree, from the weakest to the strongest.

In order to combine these two actions, that of a constant upward current, with that of oscillations of slight extent (having only the object of shaking and disaggregating the lumps, and facilitating the descent of the pieces of shale), a small continuous current of steam is allowed to enter the reservoir, by a cock which is unconnected with the distributor.

This is how an operation of washing takes place. The charge being brought over the tank, the cock of the ascending current is opened; and, when the water has reached the height of about a metre (3 ft. 3 in.) above the table, the coal is dropped in. Under these conditions, the charge is found to be almost entirely in suspension, which may be ascertained by thrusting a stick into the tank, when it will be seen that the stick can be made to penetrate, without any great effort, to the wash-table; it is then that the supplementary jets of steam are admitted by hand, by means of the distributor, in order to complete the separation into classes, When the water reaches the top of the vat, the steam is turned off, and the exhaust is opened.

After a few minutes, the mud is thrown down, and the table is then raised, by means of a hydraulic ram. The water which covers the coal, not being able to pass through the mud formed by the coal dust, runs over the tank, and flows into a reservoir, whence it is returned to the apparatus.

The charge, which is about a metre high, presents itself under the form of a loaf, in which may clearly be distinguished the order in which the grains were deposited. The removal of each one of these various qualities is affected by means of a scraper, in horizontal slices, the thickness of which varies according to the quality of the coal.

The upper layer, composed of dust and very fine grains, is, as a rule, sufficiently pure to be employed for making coke: its proportion of ash is only from 4 to 12 per cent. for the generality of the coals of the Loire basin, but it sometimes reaches 20 per cent. with clayey dust, and in that case must only be used when mixed with coal of inferior quality for the firing of steam boilers. In any case this dust, which is extremely fine, yields all that may reasonably be expected from it; indeed, to bring it to a greater degree of purity would be impossible.

As to the lower layers, with the exception of that of the shale, which is always very clearly defined, their thickness cannot be determined beforehand, so as to secure proportions of ash more or less high; it is always necessary to regulate them by experience with each quality from different localities.

If, indeed, one reflects on what takes place in a separation into classes by an ascending current, with or without oscillations, on coal just as it comes from the pit, or merely coarse-screened, one will understand that it is only possible

* 1 millimetre=·039 in. † A centimetre=·39 in.

to obtain in the first operation a rough separation *of the sizes and densities*, and that, although the purification may be judged sufficient for certain purposes, it can never be perfect; for, with a very few exceptions, the coals contain very fine ashy sand, as well as "*barrés*" (striated coal) or "*crus*" (raw), the densities of which comprise all the variations from the purest coal to shale; and these grains of different natures are necessarily found distributed throughout the whole charge. From this, it results that, if each one of these layers, the thickness of which is then determined by the degree of purification which it is desired to attain, be submitted separately to a series of siftings, so many samples with different proportions of ash will be obtained.

TO BE CONTINUED.

ANNUAL REPORT OF THE LEHIGH COAL AND NAVIGATION COMPANY.

The Board of Managers respectfully submit their report for the year 1875, as follows, viz.:

Revenue from Railroads		$1,059,348 67
" " Nesquehoning Tunnel Tolls		18,702 04
" " Canal		200,000 00
" " Coal lands		500,000 00
Net profit on Real Estate sold		9,899 00
Miscellaneous receipts		60,935 82
Totals		$1,849,085 53

DISBURSEMENTS.

General Expenses	59,704 72	
Rent and Taxes Nesquehoning Valley Railroad	143,247 33	
Interest Account	784,626 21	
Taxes chargeable to Landed Property and Improvements	8,421 75	
Taxes due State on Dividends, etc	72,939 03	
Sinking Fund of ten cents per ton on 397,426 13 tons of coal	39,742 60	
Four Dividends of $1 per share, each	805,595 00	1,914,276 70
Balance charged to Dividend Fund		$65,191 17
" to credit of Dividend Fund, Dec. 31, 1874		715,265 00
" to credit of Dividend Fund, Dec. 31, 1875		650,073 83

The coal tonnage on the Lehigh and Susquehanna Railroad and Lehigh Canal, compared with that of 1874, was as follows, viz.:

	1874. Tons.	1875. Tons.
From the Wyoming Region	1,519,828	1,551,644
From the Upper Lehigh Regions	221,193	133,102
From the Hazelton Regions	233,003	169 464
From the Beaver Meadow Regions, via Nesq. V. R. R.	420,871	335,270
From the Beaver Meadow Region, via L. V. R. R.	57 983	21,057
From the Mahanoy Region, via L. V. R. R.	44,013	33,867
From the Lehigh Region (L. C. and M. Co.'s lands)	571,945	398,042
From sundry shippers	2,651	22,389
From Hazardville diminished stock		60,984
Total	3,071,487	2,725,819
DISTRIBUTED AS FOLLOWS:		
Delivered East of Mauch Chunk by Railroad	1,958,234	1,395,860
Delivered East of Mauch Chunk by Canal	792,783	640,821
Consumed along the line above Mauch Chunk	101,441	81,405
Delivered to connecting lines above Mauch Chunk	155,843	72,601
Delivered to Lehigh Valley Railroad at Packerton	30,095	35,132
Increased Stock at Hazardville	33,091	
Total	3,071,487	2,725,819
Decrease		345,668

Of the foregoing tonnage there was shipped by the Lehigh and Wilkes-Barre Coa Company 2,046,561.09 tons.

The total production of that company was:

Of their mines in the Wyoming Region	1,367,160	1,350,927
Of their mines in the Beaver Meadow Region	525,789	336,773
Of their mines in the Lehigh Region (L. C. and N. Co.'s land)	572,617	397,338
Total	2,465,566	2,085,038

RAILROAD.

The gross receipts of the company's railroad during 1875 as compared with 1874 were as follows:

	1875.	1874.	Increase.	Decrease.
Passengers	$163,078 01	$183,158 83		$20,080 82
Freight	329,918 05	359,167 57		29,249 52
Coal	2,685,649 94	2,842,975 07		157,325 13
Totals	$3,178,646 00	$3,385,301 47		$206,655 47
L. C. and N. Co.'s proportion	$1,059,548 67	$1,128,433 83		$68,885 16

The total revenue for the year was $83,235 78 less than that for 1874, and the disbursements for interest, rent, expenses, etc., other than for dividends and taxes thereon, we re reduced $70,184 88. We paid, in 1874, three dividends of two per cent. each, and in 1875, four dividends of 2 per cent. each. The surplus in 1874 was $202,728 70, and the deficit in 1875, $65,191 17. The result of the business of the last two years shows $137,537 53 surplus earnings after the payment of 14 per cent. in dividends to the stockholders.

The reduced revenue from our railroads stated above at $68,885 16 was due to a strike of miners against an attempted reduction of wages, which lasted for nearly the whole of the first six months of the year. While the mines tributary to our road and those to the Philadelphia and Reading and Lehigh Valley Railroad Companies were idle the Delaware, Lackawanna and Western, Delaware and Hudson and Pennsylvania Coal Companies' mines were unusually active, and the shipments of the three companies in 1875 were largely in excess of those of 1874. This so far supplied the market that the Lehigh and Wilkes-Barre, and other companies who were idle the first six months of the year, were obliged to restrict production during part of the last six months, for want of a full demand for their coal.

The receipts of the railroads

From Jan. 1 to June 30 were	$644,291 00
" July 1 to Dec. 31	2,534,355 00
	$3,178,646 00

Twenty per cent. in the first and eighty per cent. in the last half of the year. The loss of tonnage on the canal was 151,962 15 tons, which was partly compensated for to the Central Railroad Company of New Jersey, by the entire freedom from loss by high water during the year.

We have credited to the lessees $371,787.94 for construction work since the last report. During the year, 6·30 miles of second track were laid on the main line, and 5·48 miles on the Nesquehoning Valley Railroad, a total of 11·78 miles of second track, at a cost of $214,153.46. The remainder was for sidings, buildings, branch road, etc., and for grading for second track and sidings on which the superstructure has not yet been laid.

We have now in use of double track on the Lehigh and Susquehanna Railroad ..... 47.98 miles.
On the Nesquehoning Valley Railroad ..... 5.48 "
A total of ..... 53.46 "

Our lessees, with our approval, commenced in August last the construction of a branch road from the mouth of Sandy Run, 4¼ miles below White Haven, to Eckley and Drifton, a total distance of 10 2-3 miles. This branch is expected to bring a large amount of coal to the main line. As a part of the agreement with the Central Railroad Company, under which they commenced the work, we contracted to pay them $150,000 on account of their advances for construction work, and we made the payment during the fall.

The arrangements between the two companies as to the mode of doing construction work, its inspection, and the examination of bills, have been very much improved during the past year, and the monthly accounts are now settled promptly and to the satisfaction of both parties.

The differences which arose at the commencement of the lease have all been settled, but not in time to make the entries in last year's account. The amount due the Central Railroad Company for advances on this account, for work done up to the close of 1875, is about $680,000, including over $90,000 paid by them to contractors on the Sandy Run branch, for which no bill has yet been rendered to us.

The money expended during the last few years, in increasing the capacity of the railroads and the larger sums expended by our lessees for equipment and in the development of coal lands tributary to the road, have produced very gratifying results in the tonnage transported. During the months of August, September, and October last, 1,215,403 tons of coal passed over part or all of the road, an average of 15,582 tons for each working day. Of this amount, 700,715 tons were delivered to connecting roads at our terminus at Phillipsburg. The gross revenue from the transportation of coal during these three months was $1,186,746.53, out of a total of gross receipts for the three months of $1,333,080.59, and one-third of this last sum is equal to about 42 per cent. of the revenue we derived from our railroads for the whole year.

The means for the payment already referred to of $150,000 to the Central Railroad Company on construction account were provided by the sale of 3,000 shares of stock obtained by the conversion of part of the convertible loan of the company referred to in the last annual report as available for this and other purposes. The managers deemed it for the interest of the company to issue stock rather than to increase our bonded debt. They also sold 1,153 shares of stock to provide the means to make payments on 175 acres of land in Panther Creek Valley, the purchase of which was reported at the last annual meeting. There is still due on this purchase $63,528.12.

The capital stock was increased during the year by the conversion

By the company of $150,000 convertible loan	3,000 shares.
By the company of $57,650 convertible loan	1,153 shares.
By holders of convertible loan $91,000	1,820 shares.
	5,973 shares.
Total present issue	204,971 shares.

The company still has the right to issue $986,970 82 of convertible loan due in 1882, which would yield, if converted, 19,739 shares of stock. It is not likely that the financial wants of the company will require the issue of any large part of this during 1876.

The lessees of our coal property paid the monthly rent of $41,666 67 promptly and regularly during the year. No coal was mined until about the 1st of July, and the six months' production amounted to 397,426 13-100 tons, of which 69,074 1-100 tons was pea and buck-wheat. The royalty of 21 per cent. on the price realized at Mauch Chunk amounted

To 64 3-10 per cent. on 328,352.12 tons of lump and prepared sizes	$211,119 75
To 21 per cent. on 69,074.01 tons of pea and buckwheat	14,505 54
To the difference between this amount	225,625 29
And the rent paid	500,000 00
	$274,374 71
Must be added the royalty paid in advance in 1874	167,105 65
Making a total of royalty paid in advance	$441,480 36

This overpayment, as was explained in our report of last year, will be reserved hereafter by the lessees from any amount then due us over and above the minimum rental.

The lessees have continued the improvements commenced by this Company previous to the lease, and they are now so far advanced as to make it probable that during the coming spring the capacity of the mines will reach 100,000 tons a month, and will be in excess of that quantity before the close of the year. The transportation of this large increase of production will add materially to the revenue of the Company's Railroads.

The regular payment of dividend, since we resumed in June, 1874, has made our stock grow steadily in favor with investors.

The first dividend was paid to			974	stockholders.
The fourth	"	"	" 1,644	"
The sixth	"	"	" 1,840	"
The eighth will be	"	"	2,237	"

The floating stock is being gradually absorbed for permanent investment.

In answer to the question "How much property has the Company not covered by its mortgages?" which was asked at the last annual meeting, we will state that the real estate unincumbered is worth at least $700,000, and the personal property, bonds, etc., at least $350,000.

The Company has no floating debt whatever.

By order of the Board of Managers of the Lehigh Coal and Navigation Company.

E. W. CLARK, President.

STRICT MINING RULES BY THE P. & R. COAL & IRON CO.—The following notice has been issued by the P. & R. C. & I. Co., signed by General PLEASANTS:

"The dull state of the coal trade makes it necessary for the Philadelphia & Reading Coal & Iron Company to send its coal to market entirely free from slate, bone, and dust.

"Therefore, all superintendents and bosses will be held responsible for the preparation of the coal at their respective collieries, and for the strict observance of the following regulations:

"First. All coal mined by the wagon must be sent to the surface free from slate, bone, and dirt.

"Second. Any miner sending one or more wagons of such coal containing slate bone or dirt will not be paid for them; and when such offences are repeated in any month, he will be suspended from all work for two days for the second offence, and discharged from that colliery for the third offence.

"Third. Any loader employed by this Company who will load slate, bone or dirt with the coal, if employed by the day, will be suspended from all work for two days for the first offence, and discharged from that colliery for the second offence, and if employed by this Company to load by contract he will not be paid for any wagons containing slate, bone, or dirt with the coal.

"Fourth. Where there is coal in the shutes of breasts worked by the wagon which is mixed with slate, bone, or dirt, the coal must be loaded in separate wagons from the slate, bone, or dirt; and if in such cases the loading is done by parties employed by this Company by contract, the wagons of slate, bone, and dirt are to be paid for the loading thereof by this Company the same as if they were filled with coal, providing that no coal is put in with the said refuse. The cost of loading and delivering on the surface all such wagons of slate, bone, or dirt will be charged to the miner from whose breast the same may have been sent."

SOME NOTES ON ELECTRO-METALLURGY.*

By N. S. Keith.

THE cheapness and ease with which electric force can be developed by the application of mechanical force to the armatures of magneto-electric machines open greatly increased opportunities for the exercise of the art of the electro-metallurgist. Heretofore the cost of producing currents of electricity, precluded their economical application to many useful branches of industrial art. For instance: to electrically deposit a pound of copper, the expenditure of at least a pound of zinc, and a pound and a half of sulphuric acid, is requisite, as well as the unavoidable waste of half as much more of zinc and acid. The cost then for depositing a pound of copper by electricity developed by a galvanic battery is at least twenty-eight cents per pound. It must be observed that ordinary commercial zinc is not suitable, as the wastage is too great. Specially prepared zinc, costing at the cheapest fifteen cents per pound, must be used. By the magneto-electric machine a pound of copper can be deposited for less than two cents. If all of the mechanical force applied to such machines be utilized as electric force, the cost would be nearer half a cent per pound. Here is a chance for invention, as the possibilities and probabilities are great.

The art of Electro-Metallurgy undoubtedly originated in the discovery by DANIELL, that copper deposited upon the negative plate of the battery which he invented, and which bears his name, was cohesive enough to bear removal therefrom, and that the plate or sheet thus obtained, bore in reverse the faintest lines and marks, as well as the larger depressions and projections of the negative plate of the battery. The investigations and discoveries of DANIELL, SPENCER, JACOBI, DE LA RIVE, and others from 1836 to 1840, established the art of *Electrolyping*, or the formations of coverings or molds, consisting of electrically deposited copper, which were coherent enough to bear removal from the objects on which they were formed. The making, copying, and multiplying of medals, small bronzes and statues, engraved plates and various works of art, as well as the facing of types and the improved reproduction of stereotypes and type-forms, are familiar examples of this branch of the art of electro-metallurgy. The reproduction of large statues, the covering of large and intricately formed masses of iron, lead and other metals with copper, and the making of new forms in copper and other metals is now practically, economically, and commercially possible. I am informed that various of these things, are manufactured in Paris and Vienna.

Intimately associated with electrotyping is the art of *Electro-plating*, or the electro-deposition of *adhesive* coatings of metals upon objects for purposes of ornamentation, protection from oxydation and for general utility. For these purposes, naturally, gold and silver of all the metals first attracted the attention of the early experimenters. G. R. and H. ELKINTON, of Birmingham, England, seem to have been the first practical operators in this line. Theirs was the pioneer establishment in the manufacture of electroplated wares, and is now one of the largest in the world of the kind. The first patent for electro-silvering was granted to one of them in 1836. They made and used for a short time one of the first magneto-electric machines made for depositing metals. It was a ponderous and expensive affair, and its use was abandoned in a short time. Electro-plated wares have, in a great measure, taken the place of similar forms made in solid silver, or in metals covered with silver by soldering or fusing.

Within the past eight years electro-plating with nickel has grown to a prominent industry, one possessing much intrinsic value, but like all new things much overrated. The efforts made by interested persons to monopolize plating with nickel are likely to be defeated. The art of plating with nickel is almost as old as silver-plating. The introduction of machinery in the polishing of nickel opened the way for its commercial introduction. The success of nickel-plating depends as much upon the revolving "buff" used in polishing, as the success of silver-plating depends upon the "burnisher" used in polishing silver.

Tin and iron are electrically deposited, but to a far less extent than the metals just mentioned. Alloys, such as brass, bronze, and German silver, have been deposited to some extent. I have recently heard of an alloy of nickel and tin thus formed into a protective coating which is said to be harder than nickel alone, and to be insoluble in either of the mineral acids, even though at a boiling temperature.

A recent application of electricity is in making the types or plates from which to print pictures taken by photography. A plate coated with prepared gelatine is exposed in the camera. The portions of the prepared gelatine made insoluble by action of light from lines which remain after the soluble portions are washed away. These lines become depressions in the copper-plate made by depositing copper upon this prepared surface, thus resembling an engraved copper-plate.

Another application recently made is in the separation of the tin and iron of waste tin-plate. The apparatus and process is as follows:

A large vat made of boiler iron, and of the dimensions, 4 feet wide 6 feet long, and 16 feet deep, with a hopper-shaped bottom, is filled nearly to the brim with a solution of common salt, made alkaline with caustic soda. This solution is made to boil by means of steam admitted to a coil of pipe within the vat. Above the vat, horizontal and parallel with its length, is a shaft carrying two grooved pullies, on which are suspended two endless chains hanging nearly to the bottom of the vat. On these chains, at about one foot apart, are attachments for holding the ends of metal rods, each five feet long. The rods are removable, but when attached, reach from chain to chain horizontally. Away from the vat, these rods are filled by children, with the pieces of tin scrap, loosely and separately attached, so that no surface is covered by another piece. As the rods are filled, they are taken to one side of the vat, and attached by the ends to the endless chains. By a slow and continuous movement they are carried down into, through, and up out of, the solution on the opposite side. During this time a current of electricity, from a magneto-electric machine, by a conductor electrically connecting the positive pole of the machine and the shaft above the vat, passes continually by the chains to the rods, and to the pieces of tin scrap, making them the anode; from there, through the solution to the sides of the vat, making them the cathode. The vat is electrically connected with the negative pole of the machine. When there is no current, no action on the tin is perceptible, but with a proper current established, tin is dissolved from the anode (the scraps of tin-plate) and tin is deposited on the cathode (the sides of the vat) in a crystalline powder. As it accumulates it falls to the bottom, is withdrawn and utilized by melting and casting into bar and pig tin, manufactured into oxide, salts of tin, etc. The speed of the chains is regulated to agree with the time necessary for the complete solution of the tin of the scrap, so that when the rods reach the surface of the solution on the opposite side to where they were placed, they can be removed. The iron is unaffected by the operation, and the time of immersion is about fifteen minutes. The magneto-electric machine used, takes about five horse-power to drive it, and furnishes a current of electricity capable of heating, red-hot, a bar of iron ½-inch in diameter, or of fusing a similar bar ⅜-inch in diameter. About 1,500 lb. of waste tin plate can be made valuable in ten hours by the labor of three or four boys. The products are about 80 lb. of tin and 1,920 lb. of scrap iron, per ton of waste. If, in order to produce the electric current, it were absolutely necessary to use zinc and acid, the operation would be too costly for practical use.

Another application of the art of electrotyping is the manufacture of argand burners. Into a mould made of the size, and like the inner surfaces of the burner is cast a fusible alloy. A large number of these forms are made, and hung in an electrolytic bath, consisting of a solution of sulphate of copper, and are electrically connected with the negative pole of a magneto-electric machine; the positive pole of the machine is connected with plates of copper, also placed in the bath. The current causes the solution of the plates and the deposition of copper upon the forms. When the copper deposit comes thick enough, the forms are removed, washed, and heated, until the alloy runs out, leaving a shell of copper, which needs but little work to fit it for market. They can be made cheaper than from sheet metal, as otherwise manufactured. If this had to be done by the use of a galvanic battery, the expense would be too great. There are a great number of articles which can be made more cheaply in this way than in any other known. If pig copper, costing, say, 20c. per lb., be used for the anode, the deposit, by a machine, will cost no more than 22c. per lb., while sheet copper is worth 30c. to 35c. per lb., and more for very thin. A waste of from 10 to 25 per cent. in cutting the sheet metal to the desired shape, and the labor thereon must also be considered.

It is possible to thus produce or copy large pieces of statuary with greater accuracy, and cheaper, than by casting in bronze, or beating from sheet copper.

TO BE CONTINUED.

* A paper read before the American Institute of Mining Engineers, at the Washington meeting, February, 1876.

SELECTED LIST OF PATENTS.

FOR THE WEEK ENDING MARCH 3, 1876.

Relating to Mining, Metallurgy, Gas Making, Engineering, etc. Reported for the "Engineering and Mining Journal" by Louis Bagger & Co., Solicitors of Patents, Washington, D. C.

173,482. Earth Augers, H. C. Lyon, Webster, Mich.—The Auger-body consists of two tapering sections, hinged together above, and secured by a band. The lower edge of the body is provided with angular cutting-lips, secured to the bottom and side. On the inner side of the cylinder, a short distance above the bottom, are secured two oblique blades, to assist in loosening and raising the earth.

173,508. Draw-Bridge Gates, L. Simon, Chicago, Ill.—The gates of a draw or swing bridge are operated by a central and two bent side levers, provided with friction-wheels, and secured by a pivoted spring locking device arranged on a central plate. The standards of the gates project below the floor and are connected to the levers by links. A spring throws the central lever out when the gates are open.

173,532. Ore-Concentrators, C. Crane, Perley's Park, Utah.—Ore is fed with a stream of water, from a series of fan-shaped spouts upon a literally inclined endless carrier. The lighter parts are washed across the belt into a suitable trough, the heavier being carried along upon the belt, and deposited in suitable receptacles. The belt is washed clean of ore by a series of jets from a water pipe.

173,541. Railroad-Rail Joints, G. N. Hodgson, Enfield, N. H.—As an improvement in rail joints, the combination of the rails, which are laterally braced at their meeting ends, with longitudinal sleepers, that extend on both sides of the joint, and are bound by the cross ties at both ends, to provide a steady, continuous bearing for the rails.

173,579. Piston Water-Meters, A. Bergstrom, Minneapolis, Minn.—Water passes from the stuffing-box through the upper piston-rod into one of the compartments of the hollow piston. The latter moving upward, the water above the piston is forced through a valve into the interior of the piston, and thence out through the lower piston-rod.

173,643. Apparatus for supplying Water to Rotary Puddling Furnaces, E. A. Jones, Middlesborough, England.—The stationary ring incloses an annular water-space, from which water is supplied to the puddler-casing, the ring being supported or suspended, so that its weight does not fall upon the puddler.

NOTES.

THE CONSOLIDATED OIL AND MINING COMPANY, of New York, has leased all the oca lands owned by the Erie Railroad Company, in McKean County, Pa., to develop them for petroleum. The lease embraces over thirty-three thousand acres.

THE COAL MINERS OF THE MCLEAN COUNTY, ILL., COAL COMPANY have struck on account of a reduction in their wages, and the works are idle. The company on the one hand and the miners on the other will now endeavor to determine which can hold out the longest.—*Intercocan.*

COAL LANDS AT AUCTION.—We note a recent auction sale at Philadelphia of one-eighth part of the coal lands known as the Red Mountain Tract, situate in Reilly Township, Schuylkill County, Pa., for $15,500.

MAMMOTH PUMPING ENGINE.—The finest pumping engine ever constructed for the Pacific Coast is now being built for the Chollar-Potosi, Hale and Norcross and Savage Combination shaft. Before proceeding to the description of this engine a few words concerning the shaft, at which it is placed, will not be amiss. "The timbers used in this combination shaft are 14x14, red mountain spruce. The shaft when timbered up will contain four compartments, three of which are 5x6 feet each, and the fourth, which is to be used for the pump shaft, is 7x6 feet. Everything has been made to correspond with the gigantic plan of sinking 4,000 feet perpendicularly. The engine which is to run the pumps and lift the water out of this mammoth shaft, like that to be placed at the Belcher air-shaft, is to be a vertical, compound, inverted-beam, condensing engine, and will also be regulated as to its stroke by PATTON'S improvement to DAVEY'S differential valve, so that it will make a stroke once in five minutes, or twelve strokes per minute, or any rapidity of stroke between these extremes. The initial cylinder will be thirty-two inches in diameter, and have a stroke of ten feet and ten inches. The expansion cylinder will be sixty-five inches in diameter, and have a stroke of eight feet. This engine is calculated to run a double line of twelve-inch pumps 4,000 feet. It will be 700-horse power, weigh 700 tons, and cost $500,000. The connections will be direct from the piston-rods of the engines to the bishop-head of the bob. The pumps composing the double line will be placed each side of the pump-rod, and to economize room in the shaft, these pumps will be placed upon one side of the shaft, and at the pump stations chambers will be excavated, and the valve-chambers of the pumps placed therein, so that the removal of the valve-chamber doors of the same may be accomplished within these excavations. The pump man is thus removed from all the dangers incident to his position, and, except, when passing from excavation to excavation will be as safe as if sitting with his family at home. An auxiliary hoisting engine will be used in sinking until such time as it is deemed prudent to put in permanent machinery, when engines of improved plans and increased power will be placed at the shaft. These hoisting engines will be of corresponding weight and power with the pumping engine above described.'—*Virginia City Enterprise.*

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending March 4.

Tons of 2,240 lb.	1876.		1875.	
	Week.	Year.*	Week.	Year.*
Wyoming Region.				
D. and H. Canal Co	† ...	240.866	53,036	450,023
D. L. and W. RR. Co	4,828	193,323	47,736	341,344
Penn. Coal Co	....	179,259	15,971	191,928
L. V. RR. Co	1,481	1.6,235	14 011	195,099
P. and N. Y. RR. Co	....	3,952	964	1,963
C. RR. of N. J	437	114,883	5.581	29,947
	6,746	848,518	137,299	1,210.364
Lehigh Region.				
L. V. RR. Co	9,159	220,444	2,992	88,996
C. RR. of N. J	59	138,955	933	3,572
D. H. and W. B. RR.	918	4,441	759	3,815
	10,136	363,840	4 684	96,383
Schuylkill Region.				
P. and R. R. RR. Co	10,611	271,826	19.717	141 350
Shamokin & Lykens Val.	3,660	28,023	9,028	85,288
	14,271	299,911	28,745	226,638
Sullivan Region.				
Sul. and Erie RR. Co	1,085	9,463	260	2,198
Total	32,238	1,521,734	170,988	1,535,523
Increase	..	..	..	..
Decrease	..	..	..	..

* Year beginning January 1st.

† This reports has not been received for four weeks.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

The receipts at Port Richmond for the week were 500 tons, shipments 11,500 tons, and balance on hand 102,500 tons.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Pennsylvania Railroads amounts to 2,867 tons, as compared with the corresponding period in 1875.

Perth Amboy business:

	Tons.
Received for the week	1,726
Shipped for the week	7,388
On hand Feb 26	84,671

Receipts of Coal at Boston, for week ending March 3, and years from September 1st, 1874 and 1875.

From	Week. Tons.	Previously. 1876. Tons.	1875. Tons.
Alexandria and Georgetown	—	54,364	45,700
Philadelphia	460	342,518	249,532
Baltimore	—	73,279	70,424
Other places	2,489	150,250	100,097
Great Britain		2,510	1,733
Nova Scotia	—	12,851	14,105

The Exports of Coal from Baltimore for the week were 311 tons, and since Jan. 1st, 5,702 tons, as against 6,923 tons for the corresponding period of 1875.

Belvidere Delaware RR. report.

	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	40	3,519	..
" " " South Amboy	—	32,826	16,330
Shipments at Coal Port (Trenton)	—	..	..
" South Amboy	8,185	51,116	53,731

The Production of Bituminous Coal for the week ending March 4, was as follows:

Tons of 2,000 lb., except where otherwise designated.

Cumberland Region, Md.	Week. Tons.	Year Tons.
Tons of 2,240 lb	17,326	165,059
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	7,381	62,159
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	3,337	25,873
*East Broad Top	1,203	10 538
Clearfield Region, Pa.		
*Snow Shoe	1,476	7,313
*Tyrone and Clearfield	20,312	128,510
Allegheny Region, Pa.		
*Pennsylvania RR	3,361	27,194
Pittsburgh Region, Pa.		
*West Penn. RR	4,192	30,257
*Southwest Penn. RR	1,034	9.749
*Penn. & Westmoreland gas coal, Pa. RR.	13,890	97,030
*Pennsylvania RR	5,804	49,926
Kanawha Region, W. Va.		

* To Feb. 21.

The Production of Coke for the week ending Feb 21.

Tons of 2000 lb.	Week. Tons.	Year. Tons.
Tyrone and Clearfield	..	..
Alleghany Region	..	..
West Penn. RR	1,053	6,480
Southwest Penn. RR	7,790	58,329
Penn. & Westmoreland Region, Penn. RR.	725	5.162
Pittsburgh, Penn. RR	3,793	32,938
Total	13,361	102,909

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 10, 1876.

Anthracite.

There is but very little coal being moved, and it looks as though it were better to postpone the resumption of shipments until all contracts have been made instead of resuming on the 20th inst., as is now proposed. Applications for making contracts for coal are quite numerous and will, no doubt, greatly exceed the requirements of those making applications. The companies have agreed upon minimum quantities to be contained in all applications to contract for coal, but, as the rules regulating the business of this year are generally understood, applicants will not hesitate in applying for 20,000 tons, if it be necessary to entitle their applications to consideration, while their wants may not exceed 2,000 tons; for as many understand the rules, no one will be obliged to take coal he does not want. Some classed as consumers, in the absence of any declaration of policy concerning the regular price list, and with the prospect of *very low* prices for bituminousus coals, do not come forward quite so promptly as might be desired. From present indications it is likely that bituminous coal will be a still stronger competitor to anthracite than it was last year, and when we consider that the yards of dealers contain much larger stocks of coal than a year ago, and that the manufacturing interests are still greatly depressed, it appears doubtful that the business of this year will exceed, if it equals that of 1875.

Bituminous.

A business increased over that of 1875 is anticipated by both the Cumberland and Clearfield producers, and there is every indication that their anticipations will be realized. The Cumberland *News*, of yesterday, says:

"Commencing with to-day the rate of freight on coal on the Baltimore and Ohio Railroad, from Cumberland to Locust Point, Baltimore, will be $1.80 per ton—exactly one cent per ton a mile. The new rate is a reduction of twenty-five cents per ton from the rate that has been charged for some months past, $2.05, to which rate it was reduced, about a year ago, from $2.45."

This was indicated by the rumor which has been going the rounds that 70,000 tons of Cumberland coal had been sold to the New Haven RR. at $4.82 f. o. b. Baltimore. It is said that offers to sell, f. o. b. Georgetown, have been made at a figure as low as $3 50. We do not doubt this, although, at the present time, such companies as may be making these offers are discounting the prospects of a reduced cost of placing their coal at this port. A bill providing for a reduction of 1c. per ton per mile on coal passing over the Cumberland & Pennsylvania RR. has passed both houses of the Maryland Legislature by an almost unanimous vote, and is now awaiting the signature of the Governor to become a law. There is no doubt expressed of his signing it. Mr. HENRY LOVERIDGE, in his able argument before a committee of the Maryland Senate and House of Assembly, clearly showed that the Railroad Company is a monopoly arrayed against the best interests of the State.

Vessels have been chartered this week at $1.65 from Georgetown to Boston, and $1.20 to New York. Taking $3.50 as a price (with prospects of even a lower figure) at which coal may be sold this year, it would make Cumberland coal, delivered in New York, cost $4.70 per ton, and in Boston $5.15. The price delivered in New York would be about the same as the average opening price of anthracite coal to consumers, which price will advance 40c. during the season, while Cumberland coal, at Boston, would be about 35c. per ton, under the opening price of anthracite coal to consumers.

There is but very little business doing in Clearfield Coal although some new business has been secured, conditional on prices at time of delivery. The Pennsylvania R. R. has not announced its rates of freights for this season, but there is no doubt that they will be sufficiently low to enable the coal interests on its line to maintain and, perhaps, increase the business already established.

A Long Island Railroad Co., is in the market for some 20,000 tons of coal, but their specifications, terms, etc., do not appear to meet with general favor.

We refer to our Montreal letter for particulars of the Grand Trunk Railway Company's contracts for coal supplies for 1876.

Foreign and Gas Coals.—There are rumors of some additional sales in the East, but with this exception there is nothing worthy of notice.

Coal Trade of Philadelphia.

PHILADELPHIA, March 9, 1876.

At the adjourned meeting of the coal operators, of Schuykill County, held this week, nothing of importance was accomplished. A resolution to start on the 20th, if the other regions did, and an evident disposition to postpone beyond the 20th, were the only changes. The meeting adjourned to meet at any time at the call of the President. No progress was made towards satisfying the president of the Reading, who has been for the whole week trying a case at Sunbury, that the operators would be good boys, and therefore no tolls are published, and those who wish to contract have to operate in the dark. There is certainly something wrong when it can be permitted with impunity that a road, a common carrier, also engaged in mining and selling coal, can offer to contract for specified quantities of coal, at fixed prices for the season, and the parties doing business over their road are kept in ignorance of the rates of transportation on such contracts—the present rates of transportation render it impossible to meet, without a loss, the prices at which they offer to contract for coal on board. The thing may not be prohibited by law in black and white, but there ought to be in every fair-minded man a feeling dictating to him that the proceeding is unfair.

The limit for which the two different kinds of contracts can be taken, viz., no less than 5,000 tons to consumers and no less than 10,000 tons to contractors, and which were adopted last week by the Board of Control, does not seem to satisfy every body. If dealers can become contractors it would seem wiser to put the prices down at once 20c., and make no contracts, than reduce the minimum of 10,000 pounds, for that would ultimately be the effect of it. Having one circular price contrasting with one set of men at 20c. off that price, with another set at 40c. off, seems absurd, and to many business men unused to the extraordinary way in which the coal trade is "managed" by its would-be rulers, incredible. It would seem that business men having acquired accidently such a control of a trade, that they can fix what price they choose for a product which is an article of prime necessity, would simplify the business, fix a rate which would permit the prostrated industries of the country to revive, and invite all the trade they can possibly secure, instead of crippling it with complicated rules, which are odious to many, of no protection whatever to buyer or seller, and which give a chance to the unprincipled to gain undue advantages of the honest ones.

Early this week the freights to Boston dropped to $1.60. Many of the Jersey captains who wintered at home having since reported with their vessels before the orders for shipment have reached this market, and before the resumption at the mines, the freights dropped still more, and are now at the unusally low rate, for this season, of $1.50. They will not remain that low as soon as the orders come in fairly.

Wholesale Prices of Anthracite Coal for March, f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Weehawken	$4 60	$4 70	$4 80	$4 90	$5 50	$4 70
Pittston at Newburg	$4 45	$4 55	$4 65	$4 75	$5 35	$4 55
Wilkesbarre at Port Johnston	$4 60	$4 70	$4 80	$4 90	$5 50	$4 70
Plymouth, R. A.	....	....	$4 80	$5 00	$5 60	$4 80
Susque. Coal Co. at Amboy W.A.	$4 60	$4 70	$4 80	$5 00	$5 50	$4 80
Kingston at Hoboken	$4 60	$4 70	$4 80	$4 90	$5 50	$4 70
Lehigh Coals.						
Old Company at Port Johnston	$5 10	....	$4 90	$4 90	$5 50	$4 80
Old Company's Room Run "	$5 10	....	$4 90	$4 90	$5 50	$4 80
§Sugar Loaf, Hobok. & Amb."	$5 1	....	$4 90	$4 90	$5 50	$4 80
Lehigh Coal Exchange "	$5 10	....	$4 90	$4 90	$5 50	$4 80
Honey Brook Lehigh	$5 10	....	$4 90	$4 90	$5 50	$4 80
Beaver Meadow at South Amboy	$5 10	....	$4 90	$4 90	$5 50	$4 80
Schuylkill Coals at North 9th st., Brooklyn, E. D.†						
Schuylkill white ash	$4 60	$4 70	$4 80	$4 90	$5 50	$4 70
Schuylkil red ash	..	....	....	$5 00	$5 60	$4 70
Shamokin white and red ash	....	....	.....	$5 00	$5 60	$4 70
Lorberry	....	....	$5 70	$5 70	$5 70	$4 75
Lykens Valley	..	....	$6 10	$6 10	$6 10	$5 20

* Contractor's prices are 20c. per ton less.

† The prices of Schuylkil coals for shipment from Philadelphia are 35c. per ton less than at Brooklyn.

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

Per ton.

Freight from Hoboken and Weehawken to New York 35@40c.
" " Elizabethport & Port Johnston to N. York. 40c.
" " South Amboy to New York 40c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehaken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c

Freight by the Pennsylvania Coal Company's boats from Newburg to New York 65c.

Prices of Anthracite Coal, f.o.b. at New York Shipping Ports, to actual consumers with whom season contracts may be made.

	Lump.	Steam.	Broken.	Chestnut
March	$4 20	$4 30	$4 40	$4 30
April	$4 20	$4 30	$4 40	$4 30
May	$4 25	$4 35	$4 45	$4 35
June	$4 30	$4 40	$4 50	$4 40
July	$4 35	$4 45	$4 55	$4 45
August	$4 40	$4 50	$4 60	$4 50
September	$4 45	$4 55	$4 65	$4 55
October	$4 50	$4 60	$4 70	$4 60
November	$4 55	$4 65	$4 75	$4 65
December	$4 60	$4 70	$4 80	$4 70

Prices at Port Richmond, Philadelphia, will be 35c. per ton, less than the above.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 25	$5 00
" " at S. Amboy	5 50	6 00
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	.. ..
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt	4 25	5 75
Despard, West Va.,	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	6 00
Fairmount, West Va., " "	4 50	6 00
Newburgh Orrel, Md. " "	4 50	6 00
Cannelton Cannel, W. Va., at Richmond.	8 75	10 50
" Splint, " "	4 50	6 00
Peytona Cannel, " "	8 75	
Straitsville " at Sandusky, O	nominal.	

Manufacturing and Steam Coals.

Cumberland, at Georgetown and Alexandria, Va	$4 00@4 25 — $5 25@5
Cumberland, at Baltimore	$4 25@4 35 — $5 75@6
Kittanning f.o.b, Canton, Baltimore	$4 25@4 35

Broad Top, at the mine, per 2,000 lb., 1 10. f. o. b. Greenwich, Philadelphia, per 2240 lb, 3 90, 4 00, 4 25 and 4 50, according to destination; at Amboy, 5 00; New York, 5 45.
Clearfield and Allegheny, "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, per 2000 lb., 90; at Greenwich, Phil., per 2240 lb., 3 90, 4 00, 4 25, and 4 50, according to destination; f. o. b. South Amboy, N. J., 5 00; New York, 5 45.

Foreign Gas Coals.

	Sterling.	Am. cur'cy.
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	42/	18 00@20 00
" Gas Cannel "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S.	2 00	5 00
Caledonia, at Port Caledonia	1 60	4 75
Glace Bay, at Glace Bay	1 60	4 75
Lingan, at Lingan Bay	1 75	
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove. Chestnut.
Pittston coal, in yard	$5 50	$5 80 $5 10
Lackawanna coal, delivered	6 25	6 50 6 00
Wilkes-Barre, "	6 25	6 75 5 75
Lehigh & Locust Mountain, del'd	7 00	7 25 6 50
Schuylkill Red Ash, del'd	7 50	8 00

Our retail quotations of Pittston Coal are based on the actual selling rates of the company, nominal quotations of grate and stove are 20c., and of nut 30c, per ton above these rates. The Cost of delivery ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb	$23 00
Liverpool House Cannel " " "	†22 00
American " " "	15 00
Kanawha splint, " " "	15 00
American Orrel " " "	11@14
Red Bank Cannel " " "	14 00
Cumberland " " "	9 00

† This quotation is furnished to us by Messrs. WARD, TALBOT & OLYPHANT.

Baltimore, Md. March 7, 1876.

Reported by our Special Correspondent.

No change.

Boston. March 4, 1876.

Coal is in no wise lifted out of the confusion reported a week ago. The market is bare of actual business, the whole movement for the spring hinging upon the establishing of confidence in the anthracite combination's programme. There have been several conferences of the dealers and the transportation combination's selling agents, but nobody seems to have any decided and assuring facts with which to meet the scepticism of the dealers' largest customers.

Wednesday morning the trade met in the office of DAY & HADDELL to listen to the eloquence of the representatives of the combination. R. G. MOULTON represented the Delaware and Hudson, E. A. QUINTARD, the Philadelphia and Reading; J. F. WILSON, the Wilkesbarre and A. E. HOLDEN the Scranton. Dealers from Providence, Worcester, Fitchburg, Portsmouth, Salem, and Portland were also present. A great many questions were asked the combination's agents, the more important of which they were uninformed upon, or else—well, there was a big sleigh-ride the night before.

The hard-coal combination people are losing considerable ground by their uncertainties, and unless the New York meeting on the 10th inst. gives the selling agents clearer ideas of the mid-summer's price prospects, a much larger exodus of steam users from anthracite to bituminous than occurred last year will be chronicled the present month. The bituminous-coal people have as yet named no price, although as low as $3 50 f. o. b. at Georgetown has been quoted to a railway; but the impression seemed mysteriously abroad that even 25c. lower might be heard. The canal from Cumberland to Georgetown has not yet been opened. If the spring freshets threaten no serious damages the canal and railway companies will encourage very low quotations. No actual price will probably be named until after the anthracite combination's April circulars are out. These are promised on the 15th regularly.

There is absolutely nothing doing this week with the gas coals. The Penn and Westmoreland have settled at $4.25 f. o. b. at Philadelphia, while the Youghiogheny's are all quoting the same values.

Freights are flat, vessels are plenty, but just at the moment there are no transactions to interest carriers. *Commercial Bulletin.*

Chicago, Ill. March 7, 1876.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants. Retail prices per ton of 2000 lb. delivered to buyer.

Not much demand for coal, either hard or soft. Coke is cheap and, to some extent, takes the place of anthracite. No change in prices.

Cincinnati, O. March 6, 1876.

Reported by our Special Correspondents.

But slight change in price of coal. We quote to-day:

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	5 c.	——
Pomeroy coal "	5 c.	——
Kanawha " "	7½c.	——
Cannel coal, according to quality "	11@16 c.	——
The following are the retail prices delivered		
Pittsburgh coal, per load of 25 bus		$3 00
Youghiogheny —c.		3 00
Pomeroy —11c.		2 50
Cannel —c.		5 50
Kanawha Semi-Cannel —c.		3 00
Anthracite, per ton		10 00@11 00
Coke, at yard 7c.		——
Coke, hard and soft, delivered 9c.		——

Erie, Pa. March 6, 1876.

Wholesale, per ton of 2000 lb. Bituminous f. o. b.

Briar Hill lump	$3 75	Beaver lump	$3 50
Midway	3 25	Cat Fish	3 00

Louisville, Ky. March 7, 1876.

Specially reported by Messrs. BYRNE & SPEED.

Our market is now, as during most of the Winter, very quiet.

Please report our prices as follows;

WHOLESALE.

	per bushel		per bushel
Pittsburgh	12c	Pine Hill	—
Raymond City	9c.	Kentucky	8c.

RETAIL.

	per bushel		per bushel
Pittsburgh	12c.	Peytona Cannel	20@22c.
Raymond City	11c.	Buckeye "	20c.
Pine Hill	13c.	City-made Coke	10c.
Kentucky	10c.	Anth., per ton, $10 00 to 10 50	
Screened Pittsburgh per load		$3 00	
Screened Raymond City		2 75	
Pine Hill (Kentucky)		2 75	
Cannel		$5 to 5 50	

Milwaukee, Wis. March 7, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.

We have no change to note in the price of coal, and trade in the same remains dull.

New Orleans, La. March 1, 1876.

Reported by C. A. MILTENBERGER & Co.

We have no change to note in the rates of coal, since last report, either at wholesale or retail. The stock is ample, and the source of supply still open for further reinforcements.

The number of boats on hand on the 1st inst. was 158; barges, 1; and French Creek, 1.

Pittsburgh coal, retail, per bbl	55c.
" wholesale	28c.
" steamboats, per box	50c.
" to manufacturers, per bbl	45c.
" shipments, per hhd	$6 00
Anthracite, wholesale, per ton	
" retail, "	
Virginia Cannel, per bbl	80c.
Scotch " "	80c.
Mt. Carbon, wholesale, per bbl	
" " retail, "	
St. Bernard, wholesale, per bbl	50c
" retail, "	

Richmond, Va. March 7, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$9 00	New River Bituminous,	$4 50
" semi-Cannel	4 75	Clover Hill Coal	4 00
Coalburgh Splint	4 75	James River Bitum	3 30
Lewiston "	4 75	" " Carbonite,	5 80
Kanawha Gas coal	4 50		

San Francisco, Cal.

From the *Commercial Herald*, Feb. 24, 1876.

Imports from Jan. 1st to Feb. 16th:

	tons.		tons.
Anthracite	3,693	English	5,502
Australian	6,416	Vancouver Island	8,487
Coos Bay	7,108	Rocky Mountain	64
Cumberland	2,044	Seattle	10,744
Mt. Diablo	8,653	Bellingham Bay	3,175

The receipts during the week embrace daily arrivals from Mt. Diablo, as well as supplies of Coos Bay from the northern coast, etc. Imports include the following: From Seattle, *Levi Stevens*, 809 tons; *Henry Buck*, 970 tons from Nanaimo, etc. In the absence of reported sales, we quote Australian $10 25@10 50 ex ship. Supplies of Cumberland are well controlled, and in casks held at $22; bulk, $18. Lehigh is plentiful and prices nominal. We quote Bellingham Bay at $8.50; Coos Bay $10; California Mt. Diablo Steam, $6.25@8.25 for fine and coarse respectively; English and Scotch Steam, $9.50@10; Nanaimo, $9.50@10; Seattle, $9.50@10; Anthracite, $12@15; Lehigh, $14@15; Wellington, $10.50@11. The *Revere*, from Departure Bay, has 1,200 tons Wellington.

Toledo, Ohio. March 6, 1876.

Specially reported by Messrs. GOSLINE & BARBOUR.

We quote coal as follows:

Per ton of 2000 lb. on cars.

Hocking Valley	$3 40	Massillon	3 60
Straitsville	3 40	Youghiogheny	5 00
Shawnee	3 40	Blossburg	6 50@7 00
" nut	2 90	Cumberland	6 50@7 00
Briar Hill	5 50	Connellsville coke	6 40

ANTHRACITE.

Grate, screened	$7 20	Stove, screened	$7 70
Egg, "	7 20	Chestnut "	7 45
Lehigh Lump	9 50		

40 cents to $1 per ton additional for delivery at retail.

Montreal. March 7, 1875.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

The Grand Trunk contracts for coal were awarded, last week, at prices even lower than those of last year.

The result is about as follows, though figures may not be in all cases exact:

Buffalo Coal Company furnish 35,0000 tons at International Bridge at $3 25, United States currency. Catfish Mine, 30,000 tons at $3 60. At Toronto 20,000 tons Willow Bank coal are taken at $3 70 gold, ex vessel. At Brockville 20,000 tons, at equal to $3 50, ex vessel. At Detroit 5,000 tons are offered at $3 55. The prices for American coal were so low, only 20,000 tons Provincial coal are taken at Montreal, as against 50,000 last year. This is awarded to the Albion Mine at the low figure of $4 50 gold, per 2240 lb. This mine also furnishes the Portland supply, 10,000 tons, at $4 55 gold, per 2240 lb., duty paid. These low prices, and the limited require ment from Nova Scotia mines increase the despondency of our mine owners. Prospects are very poor for the trade of the coming season.

Prices of coal have not advanced in the city market, as is usual at this season, and for soft coal rates are somewhat easier.

Quotations are unchanged.

Freights.

Per ton of 2240 lb.

The following quotations are nominal, in many instances representing rates which have been ruling for some time past.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	2 40	....	....
Albany	*85	1 70	....	....
Amesbury, Mass	....	....	....	....
Bangor, Me	†1 50	3 00	....	1 30
Bath, Me	1 60	1 75	3 00	1 30
Baltimore	....	....	....	....
Boston, Mass	§2 00	1 50	1 65	1 25
Bridgeport, Ct	*80	1 50	2 00	90
Bristol, R. I.	....	....	2 10	1 00
Cambridgeport, Mass.	§1 90	....	2 50	1 25
Derby	....	1 65	....	....
Dighton	....	1 70	....	....
East Cambridge	1 90§	....	2 60	§1 25
Fall River	1 50	1 50	....	1 00
Hackensack	....	....	....	....
Hallowell, Me	....	....	....	....
Hartford	....	1 65	....	....
Hoboken	†85	1 40	1 25	40
Hudson	....	1 65	....	....
Jersey City	....	1 40	1 75	40
Lynn, Mass	†2 10	....	....	†1 25
Middletown	....	....	....	1 25
Mystic	....	....	....	....
Newark	....	1 50	....	....
New Bedford	1 50	1 50	2 10	90
Newburyport	2 10	1 75	2 65	1 40
New Haven	*80	1 50	125–50	85
New London	1 50	1 50	190@2	1 00
Newport	1 50	1 65	2 10	1 00
New York	85††	1 20	1 25	40
Norfolk, Va	85	60	60	....
Norwalk	85‡	1 50	....	80
Norwich	1 50‡	1 90	....	1 00
Pawtucket	1 75‡	1 90	2 20	....
Philadelphia	....	1 00	....	....
Portland	1 95	1 50	2 50	1 25
Portsmouth, N. H.	2 05@2 10	1 75	2 75	1 40
Providence	1 40	1 50	2 10	90
Petersburg, Va	....	90	....	....
Portsmouth, Va	....	....	....	....
Poughkeepsie, N. Y.	....	1 50	....	....
Richmond, Va	1 00	70	....	....
Rockport	....	....	....	....
Saco	2 50	....	....	....
Sag Harbor	....	....	....	1 00
Salem, Mass	2 00	1 60	2 60	1 25
Salisbury Pt., Mass	....	....	....	....
Savannah, Ga	....	1 50	....	....
Stamford	*80	....	....	90
Stonington	....	....	....	....
Taunton	....	....	....	....
Trenton, N. J	....	....	....	....
Troy	....	....	....	....
Warren, R. I.	....	....	....	1 00
Washington, D. C.	1 00	....	....	....
Wareham	....	1 75	....	....
Weymouth	2 00	2 00	2 60	....
Wilmington, Del	....	1 00	....	....
Wilmington, N. C.	....	1 50	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

ROBERT CROOKS AND CO.'S METAL REPORT.

LIVERPOOL, Feb. 24, 1876.

TIN PLATES.—Buyers still hold off, reports from the other side of the Atlantic being far from encouraging, and dealers, both here and there, in many cases realizing a considerable loss. Relief must come soon, or there will be serious trouble among the makers, and that will work ultimately in the direction of higher figures.

PIG IRON.—Last week the Warrant Market closed at 60/9d. sellers, and since then the depression has continued, business being done on Monday from 60/3d. to 59/6d. cash. Tuesday some transactions took place at from 59/3d. to 59/4½d., closing with sellers at 59/6d.; and yesterday the market opened at 59/, but closed with a slight improvement at 59/3d. sellers. Makers' iron has been again further reduced. The following are present figures; No. 1 Gartsherrie, 69/6d.; Coltness, 71/6d.; Summerlee, 70/; Monkland, 61/ f. o. b. Glasgow; Glengarnock, 66/; Eglinton, 59/6d. f. o. b. Ardrossan. Shipments for week ending 19th instant, 4,627 tons. Stocks against Warrants on 18th, 61,140 tons.

FINISHED IRON.—The market is as dull as can be for the season of the year. Orders appear to be held back for lower prices, and makers are gradually awakening to the fact that it is necessary, before there can be any great increase of business, that prices must be on a much lower range. We repeat last week's quotations: Welsh Bars, £7 5/; Cleveland, £7 12/6d.: Staffordshire, £7 15/. Best Bars, £8 5/. Hoops, £9 2/6d.; Sheets, £10 10/.

TIN.—A slow market during the week leaves present prices - English Ingots (L. & F.) £81; Bars, £82; Grain Bars, in barrels, £86; Granulated, £88; Straits, £77.

COPPER quiet, showing a reduction of £1 per ton on the week's business, quotations at date being—Tough Ingots, £86; best selected, £87; Sheets, £93, less 2½ and 1 per cent., f. o. b. Liverpool.

LEAD remains unchanged, figures, as in our last issue, being—English pig for plumbers' purposes, £22; Sheet £23 15/; Pipe (for water), £24 5/; Pipe (for gas) £24 10/; Shot, £25 10/.

FREIGHTS.—New York, 12/6; Boston, 7/6; Baltimore,

10/; Philadelphia, 15/; Montreal, 30/; Quebec, 35/; Toronto, 31/; Hamilton, 31/.

JOHN H. AUSTIN & Co's. rail quotations:

LONDON, Feb. 23, 1876.

American rails, 50 to 60 lb. per yard, £6 5/@£6 10/ per ton f. o. b. Wales; American rails, 50 to 60 lb. per per yard, £6 5/@£6 10/ per ton f.o.b. East Coast; Street Rails, £6 10/@£7 per ton f. o. b Tyne and Tees; Steel Rails, £8 10/@£10/ per ton f. o. b. England.

SCOTCH PIG-IRON.

WEEKLY REPORT BY WM. COLVIN & Co.

GLASGOW, February 22, 1876.

The Warrant Market continued depressed all last week, business being done from 61/ to 60/3 cash, closing on Friday with sellers at 60/9.

On Monday the unfavorable shipping returns caused a farther fall, and business was done from 60/3 to 59/6 cash.

To-day there has been a fair business done from 59/3 to 59/4½ cash, and 59/6 to 59/7½ one month, closing with buyers at the higher quotations, and sellers asking 59/6 cash and 59/9 one month.

The undernoted prices for makers' iron show a general reduction on those of last week.

			No. 1.	No. 2.
G. m. b.	at Glasgow (deliverable alongside)		..61/	60/
Gartsherrie,	"	"	..70/6	61/6
Coltness,	"	"	..73/6	63/
Summerlee,	"	"	..70/	62/
Langloan,	"	"	..71/	62/
Carnbroe,	"	"	..64/	51/
Monkland,	"	"	..61/	60/
Glengarnock,	at Ardrossan,	"	..67/	61/6
Eglington,	"	"	..60/6	59/6
Bar Iron			£8 0/ to £8 10/	
Nail Rods			£9 0/	

SHIPMENTS.

Week ending 20th February, 1875	9,133 tons.
" 19th February, 1876	4,637 "
Decrease	4,496 "
Total Decrease for 1876	16,268 "

IMPORTS OF MIDDLESBRO' PIG-IRON INTO GRANGEMOUTH.

Week ending 19th February, 1876	5,130 tons.
" 20th February, 1876	3,760 "
Increase	1,370 "
Total Increase for 1876	6,220 "

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, March 10, 1876.

American Pig.—We are only reported sales of 450 tons of Thomas No. 1 foundry in small lots at $23, and a few small lots of other brands at the same figure. There is an inquiry for some pipe irons which it is thought will bring out pretty low quotations. The production of pig iron is reduced to a small compass, yet the consumption appears to be reduced to even a greater degree. Business is duller here in the East than at any time since the panic, and there is not the first sign of an improvement in the early future. The Crane Iron Company has blown out one of its furnaces leaving but one in blast. Quotations are nominally unchanged although we constantly hear of undercutting. We quote No. 1 foundry at $23; No. 2, $21; and gray forge at $19@$20.

Scotch Pig.—This market continues quite steady under a business which enables the arrivals to be sold previous to putting into store. We note sales of 200 tons of Glengarnock, and 100 tons of Eglinton on private terms, and 50 tons of Coltness at $32.50, and 25 tons at $33. We quote Eglinton at 29@$29.50; Glengarnock at $31; Coltness at 32.50@$33; and Gartsherrie at $32.50

Rails.—We are not reported business in these, although there is quite a large inquiry for steel rails, and some good sized orders are likely to be placed during the next two weeks. We quote iron rails at mills at 42@$45, and steel at 60@$63.

Old Rails.—In the absence of transactions we quote, nominally, at $20.

Scrap.—There are a few inquiries for wrought scrap but no transactions. The stock is small, and selected cannot de bought for less than $32.

Philadelphia Iron Trade.

Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE COX & Co., Iron Merchants, 333 Walnut street Philadelphia Week ending March 9, 1876.

The week has shown some improvement in demand, but not as to price. We learn of some sales but not of the amount usual at this season of the year. On the opening of navigation a large trade is usual, but this year it is confined to small orders, not that lower prices are looked for, but that higher prices will hardly rule this season. We report sales of 500 tons Chickies forge at $22.50; 200 tons No. 1 at $23.50; 500 tons forge Montgomery at $21; 500 tons No. 1 at $23; 1000 tons No. 1 and 2 St. Charles, Chickies, Montgomery and Crane at quotations. We quote No. 1 $23 to $23.50; No. 2, $21 to $22; Gray Forge, $20.50 to $22.50 as to brand. Bar iron has not been so slow of sale for months as at this writing. The decline in price made about two weeks back has stopped what little trade there was, as a considerable amount was placed at 2.5-10 and the reduction to $2.35 destroyed all confidence in the market. We quote 2.35-100 to 2.5-10.

Nothing new in rails, either new or old.

SCRAP is dull of sale at $21 to $28 per ton.

Baltimore. March 8, 1876.

Specially reported by Messrs R. C. HOFFMAN & Co.

The iron market continues dull and depressed, and we see no sign of improvement in the near future. Sales very light, at about quotations:

Baltimore Charcoal	$32@35	Anthracite No. 3	$20@21
Virginia Charcoal	28@34	Mottled and White	18@19
Anthracite No. 1	23@24	Charcoal C B.Blooms,65@67	50
" No. 2	21@22	Refined Blooms	55@60

Boston. March 4, 1876.

PIG has had a retail business, the sales being reported at $26 and $27 for strictly No. 1 and $20 for gray forge. The New York market is now emphatically lower than Boston, and on the basis of $23 for straight lots Thomas No. 1. Car lots at an advance of 50c. ought to be put throughout New England at not over $25.50 delivered.

BAR sustains an amount of nervous uncertainty such as would seem thoroughly demoralizing on sales, and yet, with prices again quoting 50c. lower and very easy at that, the output of bars increases, and, stranger still, two or three mill salesmen are seeking orders. The trade were surprised on Wednesday by the receipt from a leading local house of a neat gold-colored circular announcing $49 28 a ton for the best refined iron. As the firm in question have three—two in gold and one in crimson—, it will be interesting to compare quotations.

Best Refined Iron circular.	No. 1.	No. 2.	No. 3.
Ordinary sizes	2.2c.	2.2c.	2¼
1 to 6x ¼ and 5-16	2.4	2⅜	2½
7–16	2.7	2⅞	3
3–16	4¾	5	5
Norway Bars No. 1 only gold	5	5¼	5¾
do shapes do. do	5¼	6¼	—
Scrap do	3½	—	4
C. No. 1 tank plate and sheets	3½	3½	—
Ship spikes, ½ inch	2¾	2⅞	—
Common iron	2	2	—

The horse-shoe war has ended. Burden says 4½c. under date Feb. 24, and the Rhode Island 4¾c. under date March 1. The Boston Rolling Mill are still sold to deliver. Nails have been reduced 35c. per keg from list prices. Old nails have been sold in New York at $19.50 f. o. b., which makes very slow values on ship iron, demoralizing the 2c. quotations.

STEEL is in good jobbing inquiry with steady prices. The circulars above cited quote:

Best English	15½ gold	18c'y	18c'y
do American	14	14	14½
do Machinery	9	9	—
Bessemer, ordinary sizes	6½	6½	—

COPPER is quiet at 22¼c. for spots and futures.

For manufactured we quote new sheathing 30c.; for bolts and braziers, 31c.; yellow metal bolts, 20@29c.

LEAD is steady, with a very small business for the week.

We quote pig 6½c for domestic and 6¾@7c. gold, foreign sheet 9½c., pipe 9c., currency; tin-lined pipe, 16½c.; bar lead, 9c., less usual trade or 10 per cent. discount.

ANTIMONY is in small stock at 14½@14¾c.

SPELTER is steady. The combination price for February has been continued at $7.75, currency.

TIN is depressed by the reports of excessive stocks in London, 1000 pigs more than anticipated, while the near approach of the *A. M. Gilson* with 2300 piculs assists to add intensity to the ease here, and market closes easy at a loss of one cent per pound.

We quote Straits 17½c.; Banca 22c.; Refined English 17½c. gold. We quote plates Charcoal I. C. $7.50; Coke, $6.50; and Terne at $6@6.50 gold.—*Commercial Bulletin.*

Chattanooga, Tenn. March 6, 1876.

Specially reported by J. F. JAMES, dealer in pig iron, etc., 233 Market Street.

The pig iron market remains very inactive, and no change in prices.

I quote on 4 months time.

Tenn. Ala. and Ga. Charcoal, No. 1 foundry			$23@$24
" " " " No. 2 foundry			21@ 22
" " " " gray forge			20@ 21
" and Georgia coke, No. 1 foundry			19@ 20
" " " " No. 2 foundry			18@ 19
" " " " gray forge			17@ 18
White and Mottled			15@ —
Tennessee cold-blast car wheel			27@ 28
Alabama " "			26@ 27

Louisville. March 7, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

Since last report our market has been a little more active for mill grades and metal suitable for steel purposes although quotations remain unchanged There is a fair demand for standard mill iron, and holders of choice brands are not disposed to make concessions. All grades of foundry are dull and unchanged.

Pittsburgh, Pa. March 8, 1876.

Specially reported by A. H. CHILDS, Esq.

The market is somewhat unsettled, owing to the continued dullness of trade and to the decided refusal of the puddlers to accept any reduction in the rate of wages. Some mills have stopped work in this department, but it is hoped that no general lockout will occur. The recent failure of another large iron house adds to the existing depression and helps to weaken the tone of the market. Quotations are

No 1. foundry	$24 50@25 00	—4 mos	
" 2. "	23 00@24 00	—4 mos	
Gray forge	21 50@23 00	—4 mos	
White and mottled	19 00@21 00	—4 mos	
Warm blast charcoal	22 00@26 00	—4 mos	
Cold blast " Western	40 00@50 00	—4 mos	

Richmond, Va. March 6, 1876.

Reported by ASA SNYDER, Esq.

Very little doing in iron. Since last report about 200 tons have been sold. Quotations have been fully realized; there is scarcely a doubt but charcoal pig iron is at its lowest. As compared with sales twelve months ago, there is an improvement of two dollars per ton.

Virginia Cold Blast Charcoal Pig Iron					$27 to $33
" Warm " "					24 to 28
" " " Coke			" "	1 X	23 to 24
" " " "			" "	2 X	21 to 22
" " " "			" "	3	20 to 21
" Anthracite	1 X				24 to 25
" "	2 X				22 to 23
" "	3				21 to 22

San Francisco, Cal.

From the *Commercial Herald*, Feb. 24, 1876.

The ship *Gov. Morton* for New York carried 658,000 lb. Pig Lead. The *Patterdale* from Liverpool brought 6,244 bxs Tin Plate, 307 tons Pig Iron, etc. The market for Bar Iron is unsettled, at least prospectively, as we are told that parties in Pittsburgh are now manufacturing a superior article by the use of earth gas, and so cheaply as to be able to sell the same at 1¾@2c. per lb. Our stock of Pig Iron is excessive and prices nominal. Sydney Pig Tin 22c. The *Cormorant*, from Liverpool, adds 8,184 bxs Tin Plate to our stock.

St. Louis. March 7, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

Our market is exceedingly dull, with by no means an encouraging prospect. Demand and prices are about the same.

Montreal. Feb. 29, 1876.

Pig iron Eglinton and Clyde $21.00@21.50; Carnbroe $21.50@22; American $24@26.; Summerlie and Calder $22.00@23.00; Langloan and Gartsherrie $22.00@23.00; Coltness $22.50@23.50; Hematite $30.00@31.00. Bar, per 100 lb., Scotch and Staffordshire, $2.25@2.30; best do., $2.50@2.60. Swedes and Norway $5.00@5.50; Lowmoor and Bowling, $6.50@7.00.—*Monetary Times.*

METALS.

NEW YORK, FRIDAY EVENING, March 10, 1876.

There has been a little more business done in some of the articles on this list, brought about, probably, by the low quotations which have prevailed. However, a great dullness prevails now, with nothing to indicate an improvement.

Gold Coin.—During the week under review gold has ranged from $114¼@$114⅞, and closed to-day at $114⅜.

Bullion.—Fine silver bar is higher, both in this market and abroad, and prices may be quoted as firm. We quote in this city at $1.15¼@$1.15⅝, gold, per oz. The San Francisco market is quoted by telegraph to-day at 10 per cent. discount, and the London market, by cable, to-day, 53d.—their standard. Fine gold bar is not quite so firm either in this or the London market. We quote in this city at par ($20.67 gold per oz.) to ⅛ per cent. premium. By cable to-day, we have the London quotations at 84/7¼d.

Copper.—There is still a great lack of activity in the market for this article. Consumers will not buy beyond their immediate requirements, believing, when low quotations are given them, that still lower ones are to follow. The sales during the week have ranged from 22c.@22⅛c. which are the quotations given us to-day. Some holders appear to have lost confidence in the article, although the position is hardly one to warrant the belief that any large quantity can be bought at a lower price than is now quoted. The London market, according to information by cable, on the 14th inst., showed a decline, quotations being at that time, £76 for Chili Bars and £84 for Best Selected.

MESSRS. JAMES & SHAKSPEARE, of London, inform us that they have received instructions from the Sole Consignee and Agent of the Wallaroo Copper Smelting Company, to dispose of by public auction (instead of by private contract as heretofore, such metal as he may import into England during the present year. The intention is to hold periodical sales, at intervals of three months, at each of which the quantity offered will probably range from 1,500 to 2,000 TONS. The first sale is fixed for Tuesday, March 28th, at one P. M., at the Baltic Sale Room, South Sea House, Threadneedle street, and will consist of about 2,000 tons, in cakes and ingots, but chiefly the former.

Tin.—Straits was quoted, by cable, yesterday, at £72-@£72 10/, or the same as a week ago. In this market 17c.@17¼c., gold, is now asked for large lots with 16¾c., bid, for any amount, although sales have been made during the week at that figure. We are reported sales during the week amounting to from 3,000 to 4,000 slabs. L. and F. is quoted at 16¾@17c. for large lots. Refined is held at 17½c., with only three tons in the market, and all held by one party. Banca is nominal at 22c.

Tin Plates.—There is but very little doing in these. Prices are unchanged. We quote, gold, per box: Charcoal tins, $7.37½@7.62½, and ternes, $6.87½@7.12½; coke tins, $6.37½6.62½; and ternes, $6.12½@6.25.

Lead.—Ordinary Domestic is held at 6½c., gold, at

which price it is quite firm. The business doing is only in small lots and makes but a very insignificant aggregate. Soft Missouri is quoted at 7·58c., currency, here. Foreign is quoted at 7c., gold.

Spelter and Zinc.—Domestic spelter is quoted at 7·75c., currency. The Combination was to have been in session to-day, and it is supposed that the price has been advanced to 8c., although such an announcement has not been made. There is but very little business doing in this article. Sheet zinc is quiet at 8⅝c.@8¾c., gold.

Antimony is quiet but firm at 15c., gold.

Quicksilver.—This market is quoted at 65c., gold, per pound; San Francisco, 59@60c., and London £10.

The San Francisco *Commercial Herald*, of Feb. 24, says: "The market since the departure of the *Belgic* for the Orient has favored the buyer, partly by reason of a lessened export demand, and more by reason of lower quoted cable prices from London. Sales here at 59@60c. At latest date the London price is £10 10/ per flask, firm, equal to 68c. per lb. here."

FINANCIAL.

New York Stocks,

FRIDAY, March 10, 1876.

With but one or two exceptions the New York Stock Market has been generally quiet and steady during the period under review. The feature of the week has again been the depression of the stock of the Consolidation Coal Company, transactions in which have aggregated over 4,000 shares, selling down to $41 per share, ex-dividend of 2½ per cent., it has rallied from that figure to 43, which represents its closing quotation.

Maryland Coal Company's stock exhibits an advance of nearly $1 per share, equal to over 5 per cent. on the market value of the stock with sales of some 400 shares, closing firm at the highest quotation of the week.

The stock of the St. Louis and Iron Mountain RR. closes strong at 26¼, being an advance of 1¾ per cent. from our last quotation. Sales of this stock for the week have amounted to some 1,600 shares.

Union Mining Company of Tennessee.—We note sales of some 1,800 shares of the stock of this company on the New York Stock Board, opening at $1 per share, and gradually selling down to ⅝ at which figure it closed.

Union Pacific RR. The following is an abstract of the annual report of this company submitted at the meeting in Boston, on the 8th inst.:

"In submitting the report of the Board of Directors for the year 1874, the earnings for 1875 were estimated at twelve millions of dollars.

The actual gross earning for 1875 were..	$11,993,831 09
Operating expenses, including taxes.....	4,982,047 05
Leaving surplus earnings.....	$7,011,784 14

"Operating expenses being 41.54 per cent. of gross earnings.

"Compared with the year previous there has been an increase of the gross earnings of $1,433,951.97, and increase in expenses of $127,344.08, increase in surplus, $1,306,607.89.

"The rate of expenses to earnings last year was considered as very small; this year it has been decreased from 45.97 to 41 54 per cent, a decrease of 4.43 per cent., and this is accomplished in the the face of the extraordinary expenses incurred during the spring floods.

"There has been expended for new construction during the year, $500,365.90 Included in this are 12 new locomotives, 41 second-class passenger cars, 85 new freight cars, iron bridge for Dale Creek; new headquarters and depot at Omaha; eating houses at Rawlins, Grand Island, Sidney and other points, and permanent waterworks at Omaha, Grand Island and Dale Creek; also a large sum to complete the rolling mill at Laramie, and a new scrap-furnace at Omaha.

"1,561 tons of steel, and 7,422 tons of iron rails; 449,733 pine ties, and 55,694 hard-wood ties have been placed in the track. $182,589.64 has been expended in replacing wooden bridges with iron and steel, and repairing permanent structure, all of which has been charged to the operating expenses.

"The consumption of fuel by the motive power for 1875, was 148,876¼ tons of coal, 7,137 cords of wood, at a cost of $4.75 per ton for coal and $6.50 per cord for wood. The increase of consumption over 1874 was 31,364¼ tons coal, and 906½ cords wood.

"The equipment of the road is now ample for present business, and consists of 164 locomotives, 167 passenger and baggage cars, and 3,060 freight cars.

"The new rolling mill at Laramie has been completed and has cost $212,503.33, and has a capacity to roll 20,000 tons per annum. It is now in full operation, turning out satisfactory work, and has re-rolled for the company during the year 6,378 tons of iron, at the contract price of $18.50 per ton.

The Report says, in conclusion. The future of the property is no longer in doubt. The steady growth of its local trade, the continual and unexpected development of the zone of country through which the road runs, demonstrating that every part of it is valuable in agriculture and grazing lands, ores, minerals and hidden treasures that daily come to light, and that for over 1,000 miles long east and west and 300 miles wide north and south, are tributary for all time to this one great artery. This will insure a steady, healthy and rapid growth to the business of the road. Its coal, iron, silver, gold, soda, sulphur, paint, oil, lead and copper products are daily increasing, and the Union and Central Pacific roads will soon carry east and west to markets a greater variety of products and precious metals than any road in the country.

Its coal traffic, to-day in its infancy, controls almost the entire fuel trade from the Missouri River to the Pacific coast, and as the manufactories, furnaces, mills and other powers become necessary the traffic in this one product cannot to-day be estimated.

A board of directors was elected as follows: OLIVER AMES, ELISHA ATKINS, SIDNEY DILLON, G. DEXTER, BENJAMIN E. BATES, OLIVER AMES, second; JAMES D. SMITH, CHARLES J. OSBORNE, SAMUEL M. MILLS, JAY GOULD, EZRA H. BAKER to succeed his father of the same name, S. H. H. CLARK, vice GEORGE D. SCOTT, JOSEPH RICHARDSON, JOHN SHARP and G. M. DODGE.

The following officers were chosen: President, SIDNEY DILLON; Vice-President, ELISHA ATKINS; Treasurer and Secretary, E. H. ROLLINS.

Mt. Sterling Coal Road.—This road is now being built by a construction company composed of the leading stockholders. The company expects to have 15 miles of road completed and ironed by April 1, and 18 miles in operation by July 1. The road is of 3-feet gauge and is laid with strap iron ⅞x2½ inches on 7x6 inch oak stringers. The completion of 18 miles of road will tap a vein three feet thick of a good quality of coal, also a region of fine timber, such as white oak, yellow pine, etc. Mt. Sterling, the starting point of the road, is the present terminus of the Lexington & Big Sandy road, now operated by the Louisville, Cincinnati & Lexington.

Mariposa Land and Mining Company.—This company has issued $500,000 in 7 per cent. convertible gold bonds, (interest payable January and July) for the purpose of funding all of its obligations, including a mortgage on the Mariposa estate for $289,608 64, which was made in settlement of all litigations in which the old company was engaged. These bonds have been placed on the free list of the New York Stock Exchange. We note sales of the same during the week amounting to $2,000, at from $100 to $100¼. The capital stock of this company amounts to $15,000,000, $10,000,000 of which is common stock, and $5,000,000 preferred stock. Sales of this stock for the week have amounted to 500 shares, at from $7 to $7.25 per share.

The assessment, levied by the California Board of Directors, February 24, will become delinquent March 24. The assessment is $1 per share, and may be paid at the New York office, 9 and 11 Nassau street.

At the annual stockholders' meeting of this company, which was recently held in San Francisco, SOLOMON HEYDENFELT, E. W. BURR, JOHN J. MCEWEN, E. W. PATTERSON, and J. W. RAYMOND were elected trustees for 1876. About sixty thousand shares were represented.

The condition of the working in the Mariposa Tunfiel up to, and including February 25th, is officially stated to be as follows:

Main tunnel, 1,247 feet; West branch, 262 feet; East drift, 50 feet; total, 1,559 feet.

DIAMOND DRILL CROSSCUTS.

No. 1, 50 feet; No. 2, 76 feet; No. 3, 252; total, 378 feet.

The January expenses of the company amounted to something over $38,000.

Quicksilver Mining Company.—This company retired $300,000 bonds last year, and $116,000 since the first of January. The company has $260,000 cash on hand, and have added $100,000 in material since January 1, 1875. The amount of bonds now outstanding is $584,000, which the company hope to be able to retire this year. The company has no floating debt.

Quotations and Sales of Stocks and Bonds,

For the week ending March 10, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	275	—
Consolidation Coal Co	45	†41	43	4025
Spring Mt. Coal Co	—	—	*34¾	—
American Coal Co	—	—	*57	—
Maryland Coal Co.	19	18½	18½	400
Del., Lack., and West. RR. Co.	119	117⅝	118	1745
New Jersey Central RR. Co.	107½	100	106¾	3144
Delaware and Hudson Canal Co.	120	119¾	119¾	347
Quicksilver Mining Co. pref'd	—	—	22	—
" " " Common	18½	17½	17½	200
Mariposa Land & Min. Co. various.	—	—	7¼	500
St. Louis & Iron Mountain RR.	26½	26¼	26½	1617
Lehigh & Wilkes-Barre Coal Co.	—	—	40	—
Total Shares sold				12008
Sale for the week previous				16002
Decrease				3994

* These are nominal quotations.
† Ex Dividend of 2½ per cent.

BONDS.

	Sales.		Price	
Ches & O. R. R. 6s, 1st. cou. on	—	.....	—	@ 36½
" " " ex coupon	—	.....	—	@ 32
Central RR. of N. J. 1st Mtg. N.	—	.....	—	@ 115
" " " 1st Cons.	10.000	.....	112	@112¼
" " " Convt.	30,000	.....	108¾	@109
Del. and H. Canal, 1st Mtg. 9s	9,000	.....	—	@113
" " 7s, '81	20,000	.....	—	@110
" " Reg. '91	—	.....	—	@114
Del., Lack. & W. R. R., 7s, conv.	—	.....	—	@—
" " " " 2d Mtg.	—	.....	—	@116
St. Louis & Iron Mount'n 1st Mtg	—	.....	—	@100½
St. Louis & Iron M'tn, 2d Mtg.	8,000	.....	—	@ 75
Lehigh & Wilkes-Barre Cons.	8,000	.....	97	@ 97¾
Total Sales	$8,000			

Closing quotations, in the absence of sales, represent the latest prices bid.

Philadelphia Stocks.

PHILADELPHIA, March 10, 1876.

The Philadelphia Stock Market has been generally steady during the past week, a fractional advance has taken place in all of our list. The stock of the Pennsylvania Railroad Company has exhibited a moderate degree of activity and closed at an advance of ½ per cent. above our last quotations, with sales aggregating 77,000 shares. Philadelphia & Reading Railroad stock has changed hands to the amount of nearly 14,000 shares and closed at an advance of ¼ per cent. The remaining portion of the list is without feature. The aggregate transactions for the week show a falling off of some 58,000 shares from the dealings of the previous week as recorded in our last.

Auction Sales of Stocks and Bonds.—We note sales of the following securities at auction during the week at the prices annexed:

375 shares of the Wilmington, Ill., Coal Mining and Manufacturing Company at $81 per share.

20 shares of the Pennsylvania Steel Company, par 100, at from $75 to $76 per share.

$10,000 of the Philadelphia & Reading Coal & Iron Company, secured by mortgage on the "Valley Furnace Estate," at 66 per cent.

$4,000 Huntington & Broad Top Mountain Railroad & Coal Company, coup. mtge. bonds at 60¾ per cent.

$4,000 Susquehanna Canal Company 6 per cent. mtge. bonds, interest due January and July, at 75¼ per cent.

Pennsylvania Railroad.—From the annual report of this company, which is to be submitted to the stockholders on Tuesday next, we present the following summary: The road, with its tributaries east of Pittsburgh and Erie, shows gross earnings of $34,464,104.38, from which, and its other revenues, there is available for rental, interest and dividends as shown in the summary of the report, $16,440,843.52. Of this amount $5,509,493 have been paid in dividends, in addition to interest on its bonded and other debt, State taxes, $460,000 to the Commonwealth on account of the main line purchase and interest thereon, rental of the Philadelphia and Erie and branch roads, and the leased lines of New Jersey, leaving a balance, including amounts received on open accounts during the year, of $2,286,597.57 to be transferred to credit of profit and loss. Against this balance has been charged the discount on all the bonds of the company sold in 1874 and 1875, as set forth in the report, leaving a net balance of $1,086,198 to increase the general profit and loss account, which, added to the present contingent fund, makes it amount to over $12,000,000. The company also shows a value in property on hand, not represented in its accounts, of over $27,000 000, besides a large increase in the value of its real estate. And what is most remarkable in a railroad report these days, is the assurance that it has paid off all the large construction and equipment expenditures of the past year necessitated in preparing for the Centennial, and all other floating liabilities, and the company *is now, for the first time in its history of twenty-nine years, entirely free from floating debt*, with a cash balance at the close of the year of over $4,900,000.

The operations of the coal companies in which the Pennsylvania RR. is interested were, as follows:

The *Susquehanna Coal Co.* produced during the year 381,774 tons.	
Gross receipts	$1 478,820 91
Expenses	1,299,614 95
Net earnings	$179,205 96
The *Summit Branch & Lykens Valley Companies* produced for the year (13 months) 1875 530,994 tons.	
Gross receipts	$1,467,529 60
Expenses	968,087 84
Net earnings	$498,841 76
The *Mineral RR. & Mining Company* produced for the year 1875 (13 months) 477,233 tons.	
Gross earnings	$1,086,359 92
Expenses	924,324 84
Net earnings	$162,035 08
Aggregate net earnings	$840,082 80
Deduct deficit in the earnings of the Lykens Valley Company amounting to	293,297 71
Leaving aggregate surplus for 1875 of	$540,785 09
The aggregate net earnings for 1874 amounted to	$670,767 71
The total coal production for 1874–5 (13 mos.) amounted to	1 390,001 tons.
The total coal production for 1873–4 (12 mos.) amounted to	1,328,934 "

The total earnings of all the lines operated by the "Pennsylvania Company," or controlled through that organization, in the interest of the Pennsylvania Railroad Company for 1875, were $23,632,761: the expenses were $15,479,679; leaving net earnings of $8,153,081. After deducting rentals, interest, dividends and liabilities of every hind chargeable thereto, $7,473,789, the net profit in 1875 on lines west of Pittsburgh was $679,291.

The report of the company is very clear and admirable, in its arrangement of the details showing the complete operations of the road, even to the most minute transactions, at a glance, and it evidently aims to give the reader the information most desired, and with as little involvement and circumlocution as possible where so many subjects are discussed and so many figures required.

Quotations and Sales of Stocks and Bonds,

For the week ending March 9, 1876.

STOCKS.

	Highest	Lowest	Closing	Shr's
Lehigh Valley RR. Co	63	62½	62½	322
Pennsylvania RR.	57¼	56¼	57	77011
Reading RR.	50¾	50⅜	50¾	13947
Lehigh Coal and Nav. Co	50¾	50¼	50½	2719
Penn. Canal	—	—	9	—
Buck Mountain Coal Co.	—	—	30	—
Fulton Coal Co	—	—	3½	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co.	—	—	84	—
St. Nicholas Coal Co.	—	—	1	—
Cambria Iron Co	—	—	17¼	—
Crane Iron Co	—	—	46	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co.	—	—	78	51
Total shares sold				91,050
Sales for the week previous				152,204
Decrease				58,154

BONDS.

	Sales.	Price
H. and B. T. RR. 1st mortgage, 7s	—	@109
" " " 2d " "	—	@104
" " " 3d " cons	—	@ 61⅝
Lehigh Valley RR. Con. mtg. 6s, Reg	3,000	@101½
" " 7s, 1910	5,000	110¾@111
" " 6s Reg	—	@107
Pennsylvania RR., 1st mtge. 6s	5 000	104¾@105
" " gen. " con. 1910	—	@104
" " gen. " 6s, reg	1,000	@107½
" " Cons. M. 6s con	—	@ 99¼
Phil. & Reading RR. 7s 93	—	@111
" " G. M. 7s, reg. & con.	2,000	@109
" " " Deb. 6s	4,000	@ 82
" " new convertible 7s	13,500	105¼@105½
Phil. & Reading C. & I. Co. Deb. 7s	3,700	@ 82½
" " Various tracts	7,000	88 @ 90
" " Deb. 7s	—	@ —
Lehigh Coal & Nav. Co., 6s '84	1,000	@104⅛
" " " RR., '97	3,000	@104
" " " Con m. 7s	—	@103½
" " Convt. gold, '97	16,500	106 @106⅜
Penn. Canal, 6s	—	@ 75
Penn. and N. Y. Canal, 7s	2,000	@110
Ches. and Del. Canal, 6s	—	@ 86
Susquehanna Coal Co. 7s	—	@ 85
Buck. Mount Coal Co. 6s	—	@ 97¼
Penn. Gas Coal Co. 6s	—	@100¼

Total amount of sales $96,000

Closing quotations, in the absence of sales, represent the latest prices bid.

Gold and Silver Stocks.

NEW YORK, March 10, 1876.

With but few exceptions the mining share list is higher, a notable feature of the report is the advance in Chollar Potosi, our present quotation being $125, an advance of $35 per share from our last. Caledonia continues strong at an advance of $8 per share over our report of the 2d inst.

Consolidated Virginia.—It is estimated that the February bullion product of this company will amount to nearly $3,000,000. This mine is now producing 750 tons of ore per day.

Crown Point.—The heat in the main east drift on the 1,700-foot level in this mine is so intense that men cannot work in it. Arrangements have been made with the Belcher Co. to tap their air shaft on the 1,500-foot level and conduct fresh air down in pipes to the 1,700-foot level of the Crown Point Mine and thus relieve it.

Sutro Tunnel.—This work, at last advices, was in 12,305 feet.

QUOTATIONS:

	No. of shares.	March 2.	March 9.
Sierra Nevada	100,000	$20	$25
Union Consolidated	100,000	13	21
Mexican	108,000	30	40
Ophir	108,000	66	71
California	540,000	90	90
†Consolidated Virginia	108,000	447	440
Best & Belcher	100,800	62	62
Gould & Curry	108,000	21	23
Savage	112,000	16	16
Hale and Norcross	16,000	45	45
Chollar Potosi	28,000	90	125
Alpha Consolidated	30,000	37	40
Imperial	100,000	12	15
Yellow Jacket	24,000	100	111
Kentuck	30,000	16	20
Crown Point	100,000	25	26
‡Belcher	104,000	38	37
Overman	38,400	73	88
Caledonia	20,000	55	63
Justice	105,000	26	26
Raymond & Ely	30,000	20	20
Meadow Valley	60,000	3	3
Eureka Consolidated	50,000	16	13
Eureka G. V.	20,000	3	3
Silver Hill	54,000	11	12
Julia	110,000	16	17

† Ex Dividend of $10 per share.
‡ Ex " $1 " "

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, room 7 Traveller Building, 31 State street, Boston.

BOSTON, THURSDAY EVENING, March 9, 1876.

There has been almost nothing doing in the copper market, for the week ending to-night. Allouez is steady at 20, bid, with sales from $21 to $20. It is said that their product for February was about 60 tons. Calumet has fallen to 168, and the same asked. Copper Falls steady at 4. Duncan Silver quiet at 150 with occasional sales at that. Franklin firmer at $14.50, bid, their product for February 91 tons. There has been an assessment levied on the Osceola Consolidated Mining Company at $2 per share, payable May 1st, 1876. The mine has bought a lot of land and two stamps the latter will be in operation by Nov. 1, 1876. They expect to be able to crush 350 tons in a few days. There is $46,000 shares, 25 par value. With the present assessments there will have been $22 per share paid in. Ridge lower at 5¼, bid, and a private sale of 50 shares made at that. Quincy steady at 39¼ to 40. We note a sale of 150 Star at 25c.

Sales for the week have been as follows:

140 shares of Allouez, at from $20 to $21 per share.
160 shares of Franklin, at from $14 to $14.50 per share.
150 shares of Copper Falls, at $4 per share, and 100 shares of Duncan Silver, at $1.50. Also 2 shares of the Baun on Copper Company at $4.00 each.

From the Houghton *Mining Gazette* we take the following announcements of annual meetings of various mining companies, to occur on the dates annexed:

Allouez, August 8.
Atlantic, March 14.
Cal. and Hecla, August 16.
Central, April 3.
Copper Falls, Sept. 13.
Dover, March 9.
Duncan Silver, May 3.
Eagle Harbor, March 14.
Eagle River, May 2.
Franklin, April 19.
Mesnard, March 28.
Michican, March 2.
National, Oct. 4.
Pewabic, March 22.
Phœnix, March 20.
Pontiac, March 14.
Rockland, April 11.
Seneca, March 27.
Superior, April 11.

The same paper gives the following as the copper product for the month of February of the companies as follows:

	Tons.	Lb.
Franklyn 90 tons 1320 pounds } Pewabic 25 tons 55 pounds }	115	1,375
Quincy	110	430
Osceola about	81	

DESCRIPTION.	Par Value.	No. of Shares.	CLOSING. Bid.	Asked.
Allouez	$50	20 000	$20 00	$21 00
Calumet and Hecla	30	80,000	167 00	168 00
Central	25	20,000	30 00	30 50
Copper Falls	25	20,000	3 87½	4 12½
Dana	25	20,000	10	15
Duncan Silver	20	60,000	1 50	1 55
Franklin	25	20,000	14 50	14 75
Humboldt	25	20,000	10	20
Madisca	25	20,000	20	23
Mesnard	25	20,000	1 60	1 65
Minnesota	25	20,000	2 50	3 00
National	15	20,000	2 25	2 50
Petherick	25	20,000	30	40
Pewabic	25	20,000	5 25	5 75
Phenix	25	20,000		
Quincy	25	20,000	39 50	40 00
Ridge	25	20,000	5 25	5 50
Rockland	25	20,000	30	35
International Silver	—	—	20	23
Star	25	20,000	20	25
Superior	25	20,000	12	15
Eastern RR.				

Gas Stocks.

NEW YORK, March 10, 1876.

Gas stocks continue dull and inclined to lower prices. Large lots of New York stocks are pressing on the market, and with the exception of New York Mutual we alter the majority of our quotations to lower figures.

The Harlem Gas Company will reduced the price of gas from $3 to $2.75 per 1000 feet, April 1st.

The East New York Gas Company have made exceptional offers to supply gas at $3 per 1,000 feet instead of $4, as heretofore.

The Staten Island Gas Company has reduced the price of gas from $4.50 to $3.75 per 1000 feet, with a further reduction of 5 per cent. on prompt payment of accounts.

The Hartford, Conn., Gas Company has reduced the price of gas from $3 to $2.75 per 1,000 feet.

The Washington, D. C., Gas Company will reduce the price of gas to $2.25 per 1,000 feet from May 1st, 1876.

The Terre Haute, Ind., Gas Company has reduced the price of gas from $4 to $3.50 per 1,000 feet.

Sales of Eastern Gas Stocks for the week are reported to us as follows: 36 shares of Lynn, Mass., Gas Company at from 95 to 95¼; 40 shares of Lowell, Mass., Gas Company at 144¾; 7 shares of the Malden and Melrose Gas Company at $95 per share.

Lighting Brooklyn.—At a recent meeting of the Lamp and Gas Committee, appointed by the Brooklyn Board of Aldermen, various propositions were submitted relative to lighting the streets of the city with kerosene oil, naptha, vapor, etc., bids ranging from $16.33 to $33.25 per year per lamp, being offered. Mr. LIBBY, President of the Citizens' Gas Company, on behalf of the gas companies of Brooklyn, stated in answer to enquiries from one of the committee that they did not propose to enter into competition with oil and candles, that as far as his company was concerned, he thought there was no prospect of a further reduction in the price of gas. He said that of the $400,000 which the gas companies received from the city, they returned $200,000 for taxes. It seemed to him that Brooklyn was as well and as cheaply lighted as any city in the country.

He said the amount of money invested by the gas companies was about $7,200,000 in stock and about $2,000,000 mere indebtedness. The land of the companies was worth something like $2,000,000. It has been generally supposed that the stock of the companies was very much watered, but such was not the case. As citizens, they should look somewhat to this interest, representing, as it does, some $8,000 000 or $9,000 000, the stock of which was widely distributed. In the Citizens' Gas Company there were about 500 stockholders.

Mr. LIBBY said that the city used about one-sixth of the gas manufactured, and, of course, it was an element in their business. He thought it perhaps would be well for the gas companies if the streets were lighted with oil for thirty or sixty days, and then the people might not be willing to part with gas again for some time to come. His company received last year $62,000 from the city, and paid $42,000 taxes. He thought that the lamps would not wear or stand the effects of storms. The temperature had great effect upon oil, and that at ten degrees below an ordinary temperature it would freeze.

Philadelphia Gas Works.—The report of the trustees of the Philadelphia Gas Works showed that the bill for lighting, cleaning and extinguishing gas lamps for the month February amounted to $42,132, which was ordered to be reported favorably.

Chicago Gas Light and Coke Co.—We note recent quotations of the bonds of this company at 105 bid, and 120 asked, these bonds pay 10 per cent. interest.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Bread st., N. Y.

Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.

Companies in New York and Vicinity	Cap. Stk.	Par.	last Dividend.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.	$5,000,000	$ 100	2½	Jan. '76	109	110
" " Bonds	900,00	1,000	3½	Aug. '75	105	
NewYork, "	4,000,000		5	Jan. '76	145	147
Metropol. "	2,500,000	100	5	Sept. '75	145	150
" " Certf.	1,000,000	...	3½	" "	102	105
" " Bonds	500,000	1,000	3½	July, "	105	
Harlem "	1,850,000	50	4	Feb. '76	120	123
Manhattan "	4,000,000	50	10	Jan. "	268	275
Brooklyn, B'klyn	2,000,000	25	5	Nov. '75	185	190
Nassau "	1,000,000	20	4	July, "	—	100
" " Certf.	700,000	1,000	3½	Nov. "	95	98
People's "	1,000,000	10	3½	Jan. '76	65	70
" " Certf.	300,000	1,000	3½	July, '75	85	86
" " Bds	325,000	....	3½	Aug. "		95
Metropol. "	1,000,000	10	3½	May, "	65	70
Wmsburgh "	1,000,000	50	5	July, "	125	132½
" " Certf.	1,000,000	....	3½	July, "	97	100
Citizen's "	1,200,000	20	2½	Jan. '76	90	100
" " Certf.	320,000	1,000	3½	Oct. '75	99	101
J. C. N.J.	386,000	20	5	July, "	160	170
Centl. Westch. N.Y.	466,000	50	4	July. "	100	105

‡ Gold.

Companies out of Town.*	Cap. Stk.	Par	Bid	Askd.
People's " " of J. C.			125	135
Citizen's G. L. Co., Newark, N.J.	1,000,000	50		90
Hempstead " " L. I., N.Y.	40,000	100		100
Jamaica, " " "	25.000	100		100
Richmond Co., S. I. "	300,000		100	105
Citizens', Rochester, "		100	60	68
Rochester Gas Co., "		100	50	
‖People's G. L. Co. Albany, "	1,000,000	100	31	40
§Mutual " Buffalo "	750,000	100	45	55
Mutual " Detroit Mich.		50	18	
Troy G. L. Co., Troy, N. Y.			108	
Brockport, N. Y., G. L. Co.	25,000	100		80
†Baltimore G. L. Co., Balt., Md	2,000,000	100	175	180
People's G. L. Co., Balt., Md	2,000,000	25	24⅞	25
Hannibal G. L. Co., Hanni., Mo.	100,000	100	95	100
La Clede, Mo		100	110¼	125
Lewiston G. L. Co., Lewis., Me	400,000	100	33	
Chicago G. L. Co., Chicago, Ill.	2,000,000	100		130
Jacksonville, Ill.	120,000	100	82	
†Lima, Ohio	60 000	100	10	
Derby G. L. Co., Derby, Conn.	160,000	100		80
Woonskt G. L. Co. Woonskt, R.I.	150,000	100	100	
Fort Wayne G. L. Co. F. W., Ind		100	90	100
North. Liberties G. L. Co. Phila.		25	29	
Wilkes-Barre G. L. Co W. B. Pa.		50	70	
Washington G. L. Co., Phila.			42	43
Pottsville, Pa. Gas Co		50	40⅜	
Portland G. L. Co. Portland, Me	350,000	50	72	75
Hartford G. L. Co., Hartford, Ct	700,000	25	44½	
Boston G. L. Co., Boston, Mass.	2,500,000	500	780	785
Chelsea G. L. Co. Chelsea, "	300,000		139	
Cambridge G. L. Co., Cam., "	700,000		132¾	
Louisville G. L. Co., Louis., Ky.			127	
Cincinnati G. L Co, Cincin, O.				200
St. Louis G. L. Co		50		160
Laclede G. L. Co., St. Louis, Mo.		100	100	105
Carondelet G. L. Co., Mo.		50		6⅛
S. F. G. L. Co. San Francisco, Cal	10,000,000	100	99⅛	100
City G. L. Co. Montreal, Can.	1,440,000	40	160	162
Consumers G. L (old.) Tor., Ont	600,000	50	132	
Hamilton G. L. Co., Ont.	150,000	40	112½	
Halifax G. L. Co., Halifax, N.S.	400 000	40	140¼	

* These quotations represent the latest obtainable prices at which sales were made.

† This Company has issued $1,000,000 in certificates in addition to their stock indebtedness, on which they pay interest at the rate of 6 per cent. gold.

‡ This Company has $30 000 in bonds outstanding.

§ $200,000 represents the bonded indebtedness of this Company; these bonds have recently been offered at 90.

‖ $300,000 of the indebtedness of this company is represented by bonds.

AMERICAN INSTITUTE OF MINING ENGINEERS.

OFFICIAL BULLETIN.

The third volume of Transactions of the Institute has been mailed to all members and associates elected prior to the February meeting. Prompt notification is requested in cases where the volume has not been received.

Foreign members of the Institute may obtain the volume by remittance of five dollars to the Secretary.

Copies of Volumes I. and II. may be had of the Secretary for five dollars each.

THOMAS M. DROWN, Secretary,
Lafayette College, Easton, Pa.

MARCH 8th, 1876.

W. B. SCOTT & CO.,
Bankers and Dealers in Gas Stocks,
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Manufacture forging and finishing machinery of the finest description for Machinists, Gun Manufacturers, Railway Shops and special purposes, making specialties of *Hand and Power Bolt Cutting Machinery*, taps for Blacksmiths, Machinists, Steam and Gas Fitters. Circulars furnished on application.

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ESTABLISHED 1845.

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made expressly for the use of Steam Fire-Engines, and will stand a pressure of 400 pounds per square inch. Officers of Fire Departments requiring New Hose will find this much superior in strength and quality to any other.

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Have had several years' experience selling and mining coal, and have a good trade. Address
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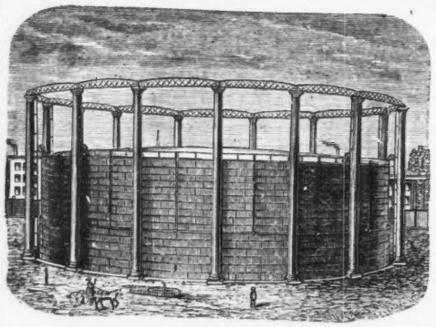

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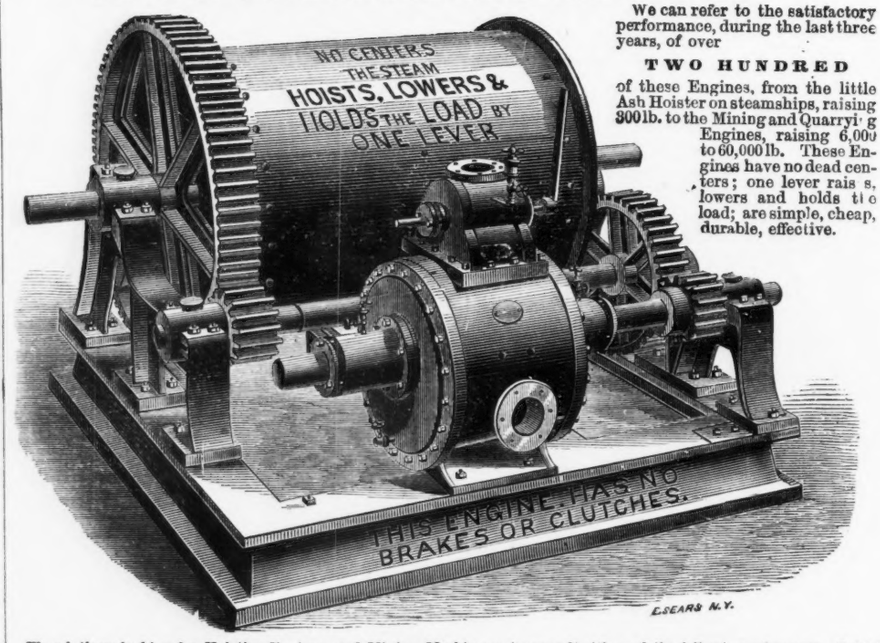

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For the Rapid and Economical Transportation of Ores, Stone, Coal, etc., etc., over Mountainous Roads.

(Covered by numerous United States Patents.) Has been in use over three years on Pacific coast, and is the most effective system ever matured. Read the following:

Office of the CHICAGO SILVER MINING CO., SALT LAKE CITY, Dec. 1, 1874.

A. S. HALLIDIE.—DEAR SIR: I have the pleasure in stating that your Ropeway, put up at the Chicago Mine, Ophir District, Utah Territory, one year ago last summer, has been in constant use ever since, and with the most satisfactory results.

The line, as you are aware, is constructed over an extremely rugged country, one and one-quarter miles in length.

For the first half mile or so, it is down a very steep mountain side, whence it passes over the brow of another one; hence it continues down Dry Cañyon at an angle of fifteen to eighteen degrees. The structure is an entire success, the entire cost of which has more than been saved already, although it has not been worked up to half its capacity. In the estimate of earnings no account was taken of supplies sent to the mine, including water, etc., by no means an inconsiderable item.

Truly yours, W. S. GODBE, Manager Chicago S. M. Co. (limited).

Supt. Office EMMA HILL CONSOLIDATED M. CO., LITTLE COTTONWOOD, Utah, Dec. 17, 1874.

A. S. HALLIDIE, Esq.: Dear Sir—In answer to your inquiry, I have to report that the Ropeway (built August, 1872), continues to work splendidly, and with but little wear on the rope. It has been everything that was promised, and has proved to be the cheapest way to move ores on mountain sides. Yours very truly, L. U. COLBATH, Sup't.

Send for circular to
A. S. HALLIDIE, No. 113 PINE STREET, San Francisco, Cal.